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SIXTH INTERNATIONAL CONGRESS ON TUBERCULOSIS

IN SIX VOLUMES

VOLUME ONE, PART TWO

PROCEEDINGS OF SECTION II

Clinical Study and Therapy of Tuberculosis—Sanatoria, Hospitals, and Dispensaries

WASHINGTON, D. C.

SEPTEMBER 28 TO OCTOBER 5, 1908

Transactions

of the

Sixth International Congress on Tuberculosis.

WASHINGTON, SEPTEMBER 28 TO OCTOBER 5, 1908.

WITH AN ACCOUNT AND CATALOGUE OF THE TUBERCULOSIS EXHIBITION,

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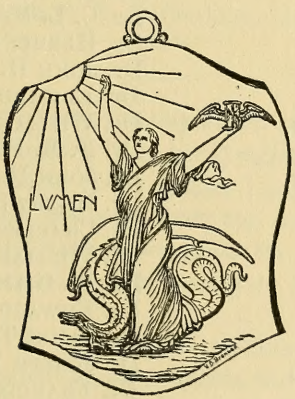

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SECTION II.

Clinical Study and Therapy of Tuberculosis—Sanatoriums, Hospitals, and Dispensaries.

FIRST DAY. OPENING SESSION.

Monday afternoon, September 28, 1908.

PRESIDENT'S ADDRESS. — TYPHO-BACILLOSIS.
MIXED INFECTIONS. — INFECTIOUS STAGE OF TUBERCULOSIS.

Section II was called to order, for its first session, by the President, Dr. Vincent Y. Bowditch, on Monday afternoon, September 28, 1908, at a quarter past two o'clock, in the New National Museum. Before taking up the regular program, the President addressed the Section as follows:

PRESIDENT'S ADDRESS.

VINCENT Y. BOWDITCH, M.D.,
Boston.

It is my privilege and pleasure to-day to bid you a most cordial welcome at the opening session of Section II of our Congress.

In my position as President of the Section I find it difficult to express my feelings at the honor which has been given me, not only of addressing such an assemblage, but of attempting to guide the proceedings of meetings which are to be, I believe, of deepest import to humanity throughout the world.

When we glance over the list of names of those who have been studying for years the means of eradicating tuberculosis, and who have cordially aided in the building up of the program before us, I think I am justified in the belief that the present Congress has never been surpassed in the wealth of material offered, and that its deliberations will give a strong impetus to the great work now going on in the world.

My only regret is that, owing to lack of time and space, it has been impossible to receive, and it will be impossible to hear, many contributions which are of undoubted value. In the construction of the program I desire to acknowledge the valuable and cordial assistance given me not only by the vice-presidents of our Section, but by others in America and abroad, whom I have asked to give their views as to what matters should be given special prominence in the discussions. The three "symposia" to be held during the week are largely the result of an almost unanimous desire that these special points should be placed before our section. To the censors I desire also here to make my public acknowledgment of their invaluable aid in deciding what papers should be selected out of the many which have been presented. The difficulty of this task, I may say, no one can fully appreciate until he has attempted it. I know that I express the opinion of the censors in uttering my own sincere regret that we have been obliged to discriminate against many. Our endeavor has been, while putting every personal consideration aside, to bring before the Congress the newer and more recent means of grappling with the tuberculosis question, leaving, oftentimes with regret, the discussion of the already better-known methods to other times and places. We trust and believe, even where difference of opinion may exist, that every one will be willing to grant our sincerity of purpose.

It would be impossible for me to express adequately my deep personal gratification that we are to be honored by the presence of many who are of international reputation, a fact which in itself will add luster to the proceedings of our Congress, and promises a more hopeful and vigorous future for mankind.

In conclusion, allow me to extend to you, our foreign brethren, my most cordial greeting, and to express the gratification which we feel that you have come from great distances to give us your aid. That your visit to us may be fraught with pleasure, and that it may serve to foster the beautiful spirit taught by the great and noble Pasteur, that science should bind nations together, making war and discord impossible, is the earnest wish of all your brethren in America.

LA TYPHO-BACILLOSE.

Par Professeur L. Landouzy,

Paris.

J'étudie dans la présente note un type de tuberculose aigue, que j'ai décrit il y a vingt cinq ans déja.[1]

Ce type, pour avoir, d'après la description que j'en donnais, été rencontré et reconnu dans la clientèle civile et militaire francaise en France et á l'Etranger, ne me parait pas avoir été suffisamment retenu par les nosographes. Vu l'importance doctrinale et pratique du sujet, j'ai pensé ne pouvoir mieux faire que d'appeller à nouveau l'attention des phthisiologues du Congrès international de Washington sur la typho-bacillose.

Je la considère comme un des types les plus nets et les plus tranchés sous lesquels, anatomiquement et cliniquement peut se présenter aigument la la septicémie bacillaire de Koch.

A l'époque que je découvrais la typho-bacillose, il était classique, parmi les expressions anatomo-cliniques, à évolution aigue ou subaigue de la tuberculose, de distinguer et de déscrire deux types.

I. Dans le premier, prenant la forme de broncho-pneumonie caséeuse, la tuberculose met quelques semaines ou quelques mois à réaliser, au moyen d'identiques lésions anatomiques d'infiltration, de ramolissement, d'ulcération, et de fonte caséeuse, le même tableau qu'elle réalise, en plusieurs années, sous les traits classiques de la phthisie vulgaire: c'est la phthisie galopante.

D'autres fois, prenant la forme de pneumonie caséeuse, et menant plus tôt à la mort, la tuberculose, toute caséifiante qu'elle est, n'a pas le temps d'aboutir aux processes ulcéreux et cavitaires. Tels sont les deux aspects de la phthisie aigue caséeuse.

II. Dans le seconde type, l'évolution est plus hative, la germination de la graine se fait plus vite encore.

Que l'infection se généralise d'emblée, ou que la dissémination bacillaire ait pour point de départ un foyer tuberculeux ancien, la tuberculose revet l'allure d'une maladie infectieuse générale, rapidement et fatalement mortelle. Faisant cortège à un état typhoide, éclatent bruyamment toute une série de troubles fonctionnels, circonscrits ou diffus, le plus souvent diffus et com-

plexes, portant ensemble ou separément, sur les appareils respiratoire, nerveux ou digestif.

L'intoxication générale de l'organisme et la diffusion des lésions tuent trop vite pour que ces lésions aient le temps d'évoluer jusqu'à leur terme naturel, conglomération et caséfication des follicules. Aussi, l'autopsie montre-t-elle des lésions touts différentes de celles de la phthisie aigue caséeuse: il s'agit ici d'une efflorescence d'innombrables granulations miliaires, jeunes, plus ou moins diffusés. Celles-ci se disséminent massivement sur les divers appareils donc la réaction fonctionnelle impose à la maladie, l'une des formes, respiratoire, nerveuse ou abdominale, qui sont les principales modalités cliniques de la phthisie aigue granuliques ou Granulie d'Empis.

III. A côté de ces faits, bien en dehors d'eux, j'en révélais d'autres, dans lesquels la toxi-infection tuberculeuse se presentait sous des traits si tranchés, qu'elle constituait un nouveau type de septicémie bacillaire, nettement distinct de précédents.

Ce troisième type, la typho-bacillose, se dénonce exclusivement par un état typhoïde, avec fièvre continue et splénomégalie sans signes de localisations viscérales.

A première vue, la ressemblance est frappante avec la fièvre typhoïde éberthienne, et l'on comprend aisément, comment ces deux états typhoïdes ont été si longtemps et sont encore si souvent confondus. Soules, des nuances symptomatiques permettent de les différencier. C'est d'abord l'irrégularité de la courbe thermique. Celle-ci pour être continue, comme dans la fièvre éberthienne, montre des oscillations, d'ordinaire, plus considérable que dans la dothienentérie, avec des irrégularités d'un jour à l'autre ou d'une semaine à l'autre. Il y a dissociation du pouls et de la température, le pouls étant, d'ordinaire, beaucoup plus accéléré chez le typho-bacillaire que chez les éberthiens.

C'est surtout l'absence de signes de localisations viscérales: absence de catarrhe pharyngé et bronchitique (constant chez les dothientériques) absence de catarrhe intestinal aussi bien que de constipation, absence enfin de taches rosées lenticulaires, dont l'importance est telle, qu'il faut, selon moi, tenir pour suspecte toute fièvre typhoïde dans laquelle a manquée l'exanthéme.

Lorsque, par exception rare, cette fièvre continue tuberculeuse aboutit à la mort en deux, trois ou quatre septenaires, l'autopsie donne l'explication de cette symptomatologie si fruste, de cette absence de signes de localisations viscérales. Elle ne montre en effet, que les lésions congestives et dégénératives, communes à touts les grandes septicémies, lésions diffuses, sans majoration sur aucun viscére. C'est à peine, si l'on trouve parfois quelques très rares et minimes granulations, du volume de la pointe ou de la

tête d'une épingle, isolées, grises et translucides, bien insuffisants pour créer une symptomatologie locale; tout juste suffisante pour donner à la maladie sa signature. Ainsi ce précise une double différence, anatomique et symptomatique, entre la granulie d'Empis et la typho-bacillose. L'absence, pour cette dernière, d'éclosion granulique dans tous les organes, et l'absence de symptomatologies locales, pulmonaire, cérébro-spinale, ou abdominale, établissent entre ces deux modalités de la septicémie bacillaire aigue une démarcation parfaitement tranchée. Un autre caractère, celui-ci évolutif, accentue encore cette démarcation. Tandis que la granulie d'Empis est toujours rapidement mortelle, la typho-bacillose guérit le plus souvent, du moins en tant qu'infection généralisée aigue. Depuis 25 ans que mon attention est attirée sur cette forme, je n'ai guère vu mourir plus de dix typho-bacillaires au cours de la période de typhisation. Dans l'immense majorité des cas, après trois à quatre semaines d'une fièvre continue, accompagnée de prostration plus ou moins accentuée, allant jusqu'à l'état typhoïde avéré, avec sécheresse de la langue, avec hypertrophie de la rate, état pour lequel on porte, suivant l'intensité des manifestations, le diagnostie de fièvre typhoïde, de typhoïdette ou d'embarras gastrique fébrile, le malade entre en convalescence. Mais, généralement, cette convalescence n'est pas franche; le malade ne reprend pas son entrain, le bel appétit des dothienentériques ne se manifeste pas, l'amaigrissement persiste. Au bout de quelques semaines, ou de long mois, apparaissent brusquement ou sourdement des signes de localisation tuberculeuse, pulmonaire ou pleurale le plus souvent, parfois articulaire, assez fréquemment aussi méningée, surtout chez l'enfant.

A cet égard, et pour mieux fixer cette évolution, j'évoquerai en quelques lignes, trois observations démonstratives, que j'ai suivies il y a 18 ans: elles se rapportent à l'enfance et à l'adolescence, ages auxquels la typho-bacillose s'observe principalement, et plus fréquemment qu'on ne pense.

Un garçon de 7 ans, sans antécédents morbids, est atteint d'une maladie aigue fébrile, absolument semblable à une fièvre typhoïde de moyenne intensité, sauf l'absence de catarrhe et de taches rosées. Au quatrième septenaire, l'enfante entre en convalescence, et on l'ammène à la campagne; il en revient bien portant, moins joufflu et moins vaillant cependant que ne le sont, d'ordinaire les enfants qui viennent d'avoir une dothienentérie. L'hiver se passe sans encombre; puis, un beau matin, l'enfant est pris de malaises, de céphalie, de vomissements, de photophobie, de fièvre, de convulsions, en quelques jours, il est emporté par une méningite tuberculeuse. Même drame, en deux actes, chez une fillette qui, à 8 ans, fait une fièvre typhoïde (?) lègere, sans taches rosées, sans catarrhe pulmonaire et intestinal; sept semaines plus tard, première bronchite sévère, tenace, fébrile du sommet droit;

deux ans après, série de nouvelles bronchites fébriles, et mort, l'année suivante, à 12 ans, méningite tuberculeuse.

Même histoire encore, chez une jeune femme de 20 ans, qui au retour de son voyage de noces, présente une maladie aigue, typhoïde, sans taches rosées, avec courbre thermique irrégulière. Au trentième jour, la convalescence commence, mais péniblement; les forces ne reviennent pas. l'appétit languit, la mine reste mauvaise; la malade commence à tousse; un mois plus tard, je constate de l'induration du sommet droit, et je trouve des bacilles dans les crachats. L'évolution continue, inexorable et emporte la jeune femme en six mois.

Parfois, la convalescence qui suit la typho-bacillose parait tout a fait franche et de bon aloi; l'apyrexie est complète, ou touche à la guérison. Cependant, ici encore, on voit survenir plus ou moins tôt, plus ou moins bruyamment, une localisation tuberculeuse. Telle l'histoire, entre autres, d'un de mes anciens malades de la charité, entré à l'hôpital avec tout le cortège symptomatique d'une fièvre typhoïde, moins les taches rosées. La maladie évolue, la température baisse, l'apyrexie survient, la convalescence commence; on songe à envoyer le malade à la campagne, lorsque survient une pleurésie gauche, nécessitant deux thoracentises.

C'est, qu'en effet, ils sont le petit nombre, les typho-bacillaires qui guérissent complètement définitivement.

Trop souvent, les typhiques bacillaires, guéris de leur fièvre, demeurent en gestation de tuberculose; et quelques semaines, quelques mois, ou plusieurs années après, la septicémie aigue initiale, ils se démasquent tuberculeux. Comme je l'écrivais, il y a 20 ans, c'est donc seulement après avoir fait un certain temps de stage dans la bacillose, que le typho-bacillaire entre dans l'amatomie pathologique et la symptomatologie tuberculeuses.

Parfois ce passage se fait insensiblement, sans la transition d'une convalescence même ébauchée. Le malade reste en proie à une fièvre continue, en même temps que s'esquisse et que, peu à peu, s'affirme la germination de tubercules. Les signes de localisation surgissent, le plus souvent sous forme d'infiltration d'un ou des sommets, décelables à la percussion et à l'auscultation. C'est le cas de plusieurs de mes malades, qui, atteints de typho-bacillose au printemps, sans aucune manifestation locale, succombaient, l'hiver, avec des cavernes pulmonaires, après dix mois de fièvre continue, sans avoir jamais quitté leur lit.

Pareilles observations, comme la notion que nous avons aujourd'hui de la typho-bacillose, nous conduisent à faire le pronostic en deux temps: *quoad vitem et quoad futurum;* et ce dernier apparait le plus important, la mort étant rare pendant premier acte de la maladie. On doit toujours se souvenir, que le typho-bacillaire, convalescent ou apparemment guéri, est toujours en imminence de déterminations tuberculeuses; ce qui a pu nous

faire enseigner, que, en somme, à bien envisager le pronostic de la typho-bacillose *quoad vitam*, il est moins sévère que celui de la dothienentérie, tandis qu'il est singulièrement plus grave à l'envisager *quoad futurum*.

Telle est la typho-bacillose que, en me basant sur les seules données de l'anatomo-clinique, je décrivais il y a 25 ans, comme type distinct et bien individualisé d'infection bacillaire aigue.

Si un certain nombre d'auteurs ont reconnu le bien fondé de cette description, et rapporté des observations décisives—telles les observations de mon savant collègue F. Widal—il s'en faut que l'accord ait été unanimi. On m'a objecté que mes soi-disant typho-bacillaires n'étaient que des dothienentériques, et que s'ils devenaient ultérieurement tuberculeux, c'était par le fait d'une association ou d'une succession microbienne. On ne manquait pas de considerer mes anciens typho-bacillaires, devenus tuberculeux, comme des dothienentériques, qui, à l'hôpital, avaient été contagionnés de tuberculose. On ne concevait pas la possibilité de guérison de cette fièvre infectieuse aigue tuberculeuse, à laquelle on voulait appliquer le pronostic toujours fatal de la phthisie aigue graniluque d'Empis.

Ce qui donnait à cette objection quelque apparence de raison, c'était la délicatesse des nuances symptomatiques sur lesquelles seules je pouvais me baser pour différencier les typhiques éberthiens. C'est, qu'en effet, à l'époque où je décrivais pour la première fois, la typho-bacillose (1883) le bacille de Koch n'était découvert que depuis un an, et la bacille d'Eberths, était à peine isolé; nous ne possédions encore aucune technique permettant de poser avec certitude absolue un diagnostic de fièvre typhoïde ou de bacillose. Je devais, faute de mieux, me contenter des nuances symptomatiques que je rappelais plus haut; il nous fallait surtout nous baser sur l évolution, et suspecte ces soi-disant fièvres typhoïdes, sans taches rosées, recidivantes et trainantes. Mais aujourd'hui, les methodes de laboratoire decouvertes depuis 10 à 15 ans, et entrées récemment dans la pratique courante, ont, à la fois apporté la démonstration scientifique de l'existence de la typho-bacillose, et facilité singulièrement son diagnostic.

D'une part nous sommes en mesure d'établier, avec certitude absolue, tout diagnostic de fièvre typhoïde à bacille d'Eberth: par la recherche du microbe pathogène dans les fecès; par la séro-réaction de F. Widal, et surtout par l'hémoculture. Ces mêmes méthodes permettent de reconnaitre avec pareille certitude les affections causées par les bacilles paratyphiques. D'autre part, l'inoculation au cobaye de sang receuilli dans la veine, aidée de la séro-réaction d'Arloing et de Courmont; de l'oculo-réaction de Calmette et Guérin; de l'enoscopie de Jousset[2] permettent de mettre en évidence avec certitude les septicémies à bacilles de Koch.

Appliqués au diagnostic de la typho-bacillose, ces méthodes de laboratoire apportent à la clinique un adjuvant précieux, indispensable même pour

donner une certitude; elles permettent d'éliminer le diagnostie de fièvre éberthienne, et souvent de saiser sur le vif l'agent causal de la maladie, le bacille de Koch.

Pour ajouter à touts ces démonstrations, une preuve de plus de l'existence de la typho-bacillose, est-il nécessaire de dire que l'expérimentation a pu, chez l'animal, en reproduire les différents modalités anatomiques, symptomatiques et évolutives?

En 1888, Yersin[3] a montré que les lapins inoculès dans la veine avec une culture de bacilles tuberculeux aviaires, meurent en 12 ou 27 jours, après avoir présenté des symptomes d'une affection aigue: fièvre, abattement, amaigrissement, et à l'autopsie, on ne constate que des lésions congestives et dégénératives, sans granulations ni tubercules macroscopiques. Straus et Gamaleïa, puis Pilliet, ont eu des résultats indentiques chez le cobaye. Récemment, Gougerot[4] a réalisé, chez les lapins, d'une façon encore plus complète le tableau anatomo-clinique et évolutif de la typho-bacillose. Non seulement, comme Yersin, il a reproduit la forme rapidement mortelle, avec exceptionnelles granulations à l'autopsie, mais encore il a réalisé la forme habituelle chez l'homme, évoluant en deux temps. D'abord, phase aigue typhoïde, qui semble guérir; puis, après une rémission plus ou moins complète et plus ou moins longue, tuberculose aigue ou chronique, avec ses vulgaires lésions tuberculo-caséeuses. Dans un cas même, Gougerot a vu un de ces lapins inoculés dans la veine auriculaire, présente une phase aigue de typho-bacillose, puis guérir définitivement.

Les expériences, en réalisant les diverses modalités évolutives de la typho-bacillose, ont fourni des examples remarquables de la succession sur un même animal, de types différents d'infection à bacilles de Koch. Après une période de typho-bacillose, avec lésions du type Yersin (c'est à dire sans productions folliculaires) ces animaux sont morts tuberculeux avec lésions du type Villemin, c'est à dire avec productions folliculaires.

Comme l'écrit Gougerot: "le type Villemin a succedé au type Yersin; de même, que dans la typho-bacillose de l'homme, le type Laënnec, succède au type Landouzy."

Je ne pense pas, qu'après touts ces preuves apportés par les recherches de laboratoire, et par l'expérimentation, on puisse encore douter de l'entité anatomo-clinique que j'ai individualisée sous le nom de typho-bacillose, ou de fièvre bacillaire non granulique, à forme typhoïde. Cette appellation a l'avantage d'être, suivant la méthode des encyclopédistes, une brève déscription plutôt qu'une définition, puisqu'elle renferme à la fois l'idée étiologique, pathogènique et symptomatologique, que nous nous faisons de la typhobacillose.

1. Landouzy, L.: Cliniques de la Charité, 1883, 1884, 1885, 1886. Leçons résumées in Journal de Médecine et de Chirurgie pratique, 1885; in Practicien, 1885; in Gazette des Hôpitaux, 1886.
"La fièvre bacillaire à forme typhoide. Typho-bacillose." Clinique Médicale de l'Hôpital Laënnec; in Semaine Médicale, juin 1891. Congrès de la Tuberculose, Paris, 1891.
2. Jousset: Semaine médicale, 19 Janvier, 1903.
3. Yersin: "Études sur la Tuberculose expérimentale," in Annales de l'Institut Pasteur, 1888, et Thèse inaugurale, Paris, 1888.
4. Gougerot: "La Typho-bacillose de Landouzy." Diagnostie bactériologique à la période d'état; in Presse Médicale, Juin, 1908.
"Reproduction expérimentale de la typho-bacillose"; in Revue de Médecine, Juillet, 1908.

Typho-bacillose.—(LANDOUZY.)

Although this form of tuberculosis, as described by me, has been encountered and recognized in civil and military practice, both in France and in other countries, it does not appear to me to have received sufficient attention from writers on nosology. In view of the theoretical and practical importance of the subject, it seemed well to call the attention of the International Congress in Washington to typho-bacillose.

At the same time I discovered typho-bacillose, the pathologico-clinical manifestations of acute and subacute tuberculosis were currently divided into two types:

(1) In the first type, presenting itself in the form of caseous bronchopneumonia, the tuberculous process, within a few weeks or months produces the identical pathologic lesions of infiltration and softening ulceration and caseous degeneration—the identical picture which requires several years for its production in the classic form of ordinary phthisis. It is, in short, galloping consumption. At other times, presenting the form of caseous pneumonia, and running a more rapid course to a fatal termination, the tuberculous process, although characterized by caseation, has not time to reach the stage of ulceration and cavity formation. These are the two forms of acute caseous phthisis.

(2) In the second type the course of the disease is more abrupt. Whether the infection be generalized from the beginning, or a general dissemination of bacilli occur from an old tuberculous focus, the tuberculous process adopts the pace of a general infection, with fatal termination. Attending a typhoid state, there is a sudden explosion of various functional disturbances, either circumscribed or diffuse—more often diffuse and complex—which, together or separately, affect the respiratory, nervous, or digestive systems. The general intoxication of the organism and the wide diffusion of the pathologic process destroy the patient's life so rapidly that the lesions have not time to reach their usual development. The autopsy shows lesions entirely

different from those of acute granular phthisis. The picture is that of innumerable young miliary granulations, more or less diffuse. These miliary granulations are scattered over the various systems of the body, and their functional reaction determines the clinical manifestations, whether respiratory, nervous, or abdominal.

(3) In addition to these forms, and distinct therefrom, I discovered others in which the bacterial intoxication and infection assume an aspect sufficiently characteristic to constitute a new type of bacillary septicemia. This third type, called "typho-bacillose," manifests itself exclusively by a typhoid state, with continuous fever and enlargement of the spleen, and without signs of visceral localization. At the first glance there is a striking resemblance to typhoid fever, and it is not to be wondered at that these two typhoid states are frequently confounded. Indeed, they can be differentiated only by delicate differences in the symptoms. These consist, in the first place, in irregularity of the fever-curve, which, although continuous as in typhoid fever, exhibits greater oscillations, and the irregularities observed from day to day, or from week to week, are greater. In the second place, there is a lack of correspondence between pulse-rate and temperature, the pulse being ordinarily more accelerated in typho-bacillose than in typhoid fever. There is a striking absence of localizing symptoms; no pharyngeal or bronchial catarrh; no intestinal catarrh or constipation; and, finally, no rose spots. If, as happens in rare exceptions, this bacillary continued fever terminates fatally in two, three, or four weeks, the autopsy furnishes an explanation of this deceptive symptomatology. Nothing is found but the ordinary congestive and degenerative lesions seen in all severe septicemias; the lesions are diffuse and show no special preference for any organ. Occasionally a few minute granulations, no larger than the point or head of a pin, may be found. They are isolated, gray and translucent, and insufficient to produce a local symptomatology; in fact, they barely suffice to stamp the disease with a special character.

Thus the differences between acute, granular phthisis (granulie d'empis) and typho-bacillose are both pathologic and symptomatic. In typho-bacillose the complete absence of granulations from all the organs, and the absence of localizing symptoms, establish a clearly defined demarcation between these two types of acute bacillary septicemia. This is further accentuated by differences in the evolution of the two diseases. While acute granular phthisis is always rapidly fatal, typho-bacillose usually ends in recovery, at least so far as the generalized acute infection is concerned. In twenty-five years I have seen barely ten deaths from typho-bacillose during the period of the disease characterized by the typhoid state. In the great majority of the cases, after three or four weeks of continuous fever accompanied by prostration, and usually going on to a true typhoid state, with

dryness of the tongue, more or less hypertrophy of the spleen, the patient becomes convalescent. But convalescence, as a rule, is imperfect; the patient does not regain his spirits. The ravenous appetite, characteristic of convalescence from typhoid fever, fails to appear and emaciation persists. At the end of a few weeks, or many months, localizing signs of tuberculosis appear, either suddenly or insidiously, usually in the lungs or pleura, and, in the case of children, quite frequently in the mesentery.

I shall cite in a few words three illustrative cases which I saw eighteen years ago. These cases occurred in infancy and adolescence, the periods of life during which typho-bacillose is observed more frequently.

A child of seven, without any previous history of disease, developed an acute febrile condition, exactly like a moderately severe typhoid fever, except for the absence of catarrh and rose spots. Convalescence began in the fourth week, and the child was taken to the country, from which he returned in good health, but not so fat or robust as children usually are after typhoid fever. The winter went by without any disturbance; then, one fine morning, the child developed malaise, headache, vomiting, fever, and convulsions, and in a few days was carried off by a tuberculous meningitis.

The same drama was enacted in the case of a little girl who, at the age of eight, went through a light attack of typhoid fever (?) without rose spots and without intestinal catarrh. Seven weeks later she had her first attack of severe bronchitis, obstinate, with fever, localized at the right apex. Two years later a succession of slight febrile attacks of bronchitis, and the following year the child died, at the age of twelve, of tuberculous meningitis.

Finally, a case of a young woman, twenty years old, who, on her return from her wedding trip, developed an acute illness of typhoidal nature, without rose spots, and with an irregular temperature curve. On the thirtieth day convalescence began, but progressed slowly; the patient failed to regain her strength; the appetite was languid; and the facies failed to clear up. The patient began to cough. A month later I discovered a solidification of the right apex and found bacilli in the sputum. The disease progressed inexorably, and the young woman succumbed in six months.

Occasionally convalescence following typho-bacillose appears to be normal and genuine. Apyrexia is complete, and recovery seems to be imminent; but even in cases of this kind a localized tuberculous lesion develops sooner or later. One of my old patients in the Charité was admitted with all the symptoms of typhoid fever except the rose spots. The sickness ran its regular course, the temperature became normal, and convalescence began. We were thinking of sending the patient to the country, when he developed a left-sided pleurisy which required two tappings. Those who recover com-

pletely and definitely from typho-bacillose are the minority. Almost always the patients continue in a state of latent tuberculosis, and, in a few weeks or months, or years, after the initial acute septicemia, they are found to be tuberculous.

As I wrote twenty years ago, "It is only after having gone through a certain probation stage in bacillose that the typho-bacillose patient develops the pathology and symptomatology of tuberculosis." Sometimes this transition takes place imperceptibly, without the interposition of even an abortive convalescence. The continuous fever persists while the tubercles gradually develop, localizing signs make their appearance, usually in the form of infiltration of one or both apices. This is what happened in the case of a number of my patients who were attacked by typho-bacillose in the spring, and died during the winter with cavities in their lungs, after ten months of continuous fever, during which they never left their beds.

The prognosis has to be made both *quoad vitam* and *quoad futurum*, and the latter seems to be the more important, since death is rare during the first stage of the disease. A patient who has had typho-bacillose, though he be apparently cured, is always in danger of developing tuberculosis. We may say that the prognosis *quoad vitam* in typho-bacillose is less unfavorable than in the case of typhoid fever; while, on the other hand, the prognosis *quoad futurum* is much more grave.

While some authors have accepted my description, and added their confirmatory observations, there is by no means unanimity on the subject. It has been objected that my typho-bacillose patients suffered from typhoid fever, and that their ultimately becoming tuberculous was due to infection or some microbic succession. My old cases of typho-bacillose were regarded as cases of typhoid fever which had become infected in the hospital. It seemed incredible that this form of acute infectious fever should end in recovery any more than acute granular phthisis, which is always fatal. What gave some apparent plausibility to these objections was the fact that the symptomatic differences are extremely slight. When I described typho-bacillose, in 1883, one year after the discovery of the Koch bacillus, when the bacillus of Eberth had only just been isolated, we did not possess the technic to make an absolutely certain diagnosis between typhoid fever and typho-bacillose. We had to depend on the course of the disease, and could only look with suspicion on the relapsing or slow cases of typhoid fever; but now that laboratory methods have been currently adopted in ordinary practice, the past few years have furnished scientific proof of the existence of typho-bacillose and greatly facilitated the diagnosis. We can make an absolute diagnosis of typhoid fever by recovering the pathogenic micro-organism in the feces, by means of Widal's serum reaction, and especially by blood cultures. This same method enables us to recognize disease caused by the

paratyphoid bacillus. Inoculation of a guinea-pig with blood taken from a vein, reinforced by the serum reaction of d'Arloing and Courmont, Calmette and Guérin's oculoreaction, and Jousset's inoscopy enable us to recognize the septicemias caused by the bacillus of Koch. Applied to the diagnosis of typho-bacillose, these laboratory methods bring certainty into the diagnosis.

The pathologic, symptomatic, and evolutional features of typho-bacillose have been artificially reproduced in the animal. In 1888 Yersin showed that rabbits inoculated with avian tubercle bacillus died in twelve to twenty-seven days, after presenting the symptoms of acute infection: fever, prostration, and emaciation. At autopsy nothing but congestive and degenerative lesions, without granulations or macroscopical tubercles, were found. Straus and Gamaleïa, and later Pilliet, obtained identical results with the guinea-pig and the rabbit. Recently Gougerot produced in the rabbit an even more perfect picture of typho-bacillose. He produced the rapidly fatal form with occasional granulations at autopsy, and also the variety usually seen in man, which develops in two stages: First, the acute typhoidal stage, from which the patient seems to recover; and then, after more or less complete remissions of variable duration, an acute or chronic tuberculosis with the ordinary caseous lesions. One of Gougerot's rabbits presented an acute phase of typho-bacillose and then recovered permanently. These experiments furnish remarkable examples of the reproduction in the same animal of different types of infection due to the bacillus of Koch. After a period of typho-bacillose with lesions of the Yersin type (without follicular changes) the animals died of tuberculosis with lesions of the Villemin type (with follicular changes). As Gougerot has said, "the Villemin type followed the Yersin type, just as in the typho-bacillose of man the Laënnec type follows the Landouzy type."

DISCUSSION.

Dr. Tom Williams (Washington) asked if cases of the Landouzy type were really not more numerous than one thought, inasmuch as many patients with such a diagnosis, who did get well for a time, disappeared entirely from view, and possibly died of tuberculosis elsewhere?

Prof. Landouzy answered that he felt quite positive that such was the case.

Dr. C. L. Minor (Asheville, N. C.): In taking the histories of my tuberculosis cases I have found a considerable number who report a previous typhoid fever, either not apparently connected with the present sickness, or followed, more or less closely, by impaired health, and finally by pulmonary tuberculosis. While the majority of these undoubtedly really had typhoid. I have gotten the strong impression that a good number were really cases of the "typho-bacillose," first described by Prof. Landouzy, and which

is fully treated of in recent French medical literature. While a positive diagnosis is impossible in cases where we only learn of the attack through the history, a strong suspicion seems often fully justified. Some develop more or less rapidly out of an apparent typhoid fever and run a rapidly fatal course, and here the diagnosis is easy; but when after an acute attack the patient apparently recovers, and only later develops pulmonary trouble, this is not the case, and we cannot be sure whether the lung trouble is really an extension of a former "typho-bacillose" or a tuberculosis developing in a patient whose resistance has been lowered by a previous typhoid fever. To settle this question, therefore, it is essential that, however typical the clinical picture, the physician should not accept a diagnosis of typhoid fever unless it can be verified by special diagnostic methods, such as the Widal reaction, and possibly the study of the blood for typhoid or tubercle bacilli, which, with the use of recent laboratory methods (ox-gall), is now possible. If we do this, I am convinced that we will find a fair percentage of cases of apparent typhoid fever which are really cases of Prof. Landouzy's "typho-bacillose."

Professor Landouzy, in closing the discussion, once more drew attention to the importance of recognizing this type in the matter of prognosis. If the Widal test were negative, and the case were otherwise not quite typical of typhoid fever, the physician should give a guarded prognosis.

MIXED INFECTIONS IN TUBERCULOSIS.

By Mazyck P. Ravenel and Arnold C. Klebs,

Madison, Wis. Chicago.

It is a sad commentary on our methods of investigation that with so much material at hand we are still at sea as to the exact part played by mixed or secondary infections in the history of a case of tuberculosis. Opinions differ widely even on essential points, which apparently should not offer any great difficulties of solution. If one examines the sputum from a series of fairly well-advanced cases of consumption, he cannot but be struck by the variety and number of micro-organisms found, as noted by Koch, Cornet, Babes, and others, early in the study of tuberculosis from the bacteriological standpoint. Still more striking is it to note that many of the micro-organisms are found in cavities located deep in the lung, and in the walls of these cavities to a certain depth. Cornet has shown that the micro-organisms of secondary infections often advance into the tissues faster than the tubercle bacilli; while Kossel and Cornet have demonstrated them in miliary tubercles widely separated from the original focus, apparently proving that they had entered the blood simultaneously with the tubercle bacilli. It seems impossible to believe that bacilli and cocci of such well-known pathogenic power as those most frequently found in washed sputum, as well as in cavities and the neighboring tissues, could live and multiply in close association with the tubercle bacilli without in some way modifying the morbid changes in the affected tissues, and consequently the symptoms.

Many observers attribute cavity formation and the destruction of tissue to secondary infections. This view was apparently confirmed by the experiment of Prudden, many years ago, when he found that cavity formation took place in the rabbit only after a second inoculation of streptococci. It is, of course, well known that cavity formation seldom takes place in experimental animals after inoculation with pure cultures of tubercle bacilli, even when the type of the disease produced is very chronic.

Cavity formation, as seen in the chronic ulcerative type of tuberculosis, is practically peculiar to man, the monkey being the only other animal in which anything like it is commonly met with. In cattle large caseous

abscesses are found which usually persist for a long time. Secondary or mixed infections do not seem to be found with anything like the constancy seen in man, though I do not know of any extensive study that has been made on this point in cattle. In swine there is a marked tendency to fibrosis of the lung, and little or no tendency to cavity formation.

It can hardly be held that the lower animals are free from exposure to harmful bacteria, though they are not susceptible to certain organisms, like the influenza bacillus, which is believed to be especially harmful to persons with tuberculosis; and probably much less susceptible to other secondary infections frequently found in man, such as the pneumococcus, streptococcus, and staphylococcus. The explanation of these differences must, I believe, be looked for in some specific power of resistance to infection, or mode of reaction against the invading organism by the tissues involved. That such differences exist is shown, for example, in the tendency of lesions in cattle to undergo calcification rapidly, rather than the caseation seen in human tissues.

In an attempt to determine the rôle played by the organisms of secondary infections Dr. Irwin and myself examined the washed sputum of a number of patients, the contents of cavities, and pneumonic areas, chiefly in the vicinity of cavities. In the main our results have agreed with those of other observers. Our post-mortem cultures were made within twelve hours of death, as a rule, and a few within four hours. The streptococcus was the organism most frequently found in cavities, and in the various organs stood second in frequency only to the colon. It was found in the spleen and bronchial glands in half of the cases in which cultures of any sort were obtained. It does not seem probable that its presence in the spleen and these glands can properly be attributed to post-mortem or agonal invasion. In areas of bronchopneumonia the streptococcus and staphylococcus (aureus and albus) were most frequently found. The examination of microscopical sections of these areas showed changes which must have begun some time before death, and which surely modified the symptoms and course of the disease. The species found corresponded fairly well with those found in the cavities of the same case.

In a few cases repeated examinations of washed sputum were made, with the purpose of comparing the symptoms of the patient during this period with the character and varieties of bacteria found. We were unable to trace any connection between them, but it remains my conviction that more extended studies along these lines will result in at least a measure of success.

A somewhat puzzling but not inexplicable circumstance is the lack of pathogenic power in the cultures of streptococcus isolated from sputum and cavities. The virulence of this organism is very variable and quickly lost in culture. Furthermore, lack of pathogenic power for certain laboratory

animals does not prove that the organism, when growing in the human body, is causing no injury. Pneumococci, when found, were almost invariably highly virulent. Cornet found the organisms of mixed infection frequently pathogenic. In spite of the constant occurrence of mixed infections, and the evidence of their injurious action, many authorities believe the tubercle bacillus alone is capable of producing the symptoms seen. There can be little doubt that the entire evolution of the tubercle, its softening, and final discharge with resulting cavity formation, can take place in the absence of secondary organisms. The tubercle bacillus alone can also produce the disturbances of temperature.

It appears certain that one of the benefits of treatment in sanatoriums located in the country lies in the comparative freedom of such places from the frequent epidemics of colds, bronchitis, influenza, and pneumonia which visit thickly populated communities. The number of varieties of organisms to which a patient is exposed in rural districts is very much less than in cities, and secondary infections correspondingly less liable to complicate matters. Those in charge of sanatoriums find it advisable to isolate patients suffering from acute infections, such as the above mentioned, and to exclude visitors who may introduce these affections into the institutions.

Some evidence of the important part played by secondary infections has been given by the results of treatment with antistreptococcic serum. The results have not been uniformly good by any means, probably on account of the well-known shortcomings of these sera, and the fact that the strain of streptococcus causing the complication was different from that used in the production of the serum. In other words, the sera used were not specific.

Much more valuable evidence has recently been brought forward in the use of homologous vaccines, and the study of the opsonic index in relation to the several secondary organisms found in the sputum. Marked improvement has been reported by several authors following, and apparently in consequence of, the administration of bacterial vaccines made from the organisms of the patient's sputum. These results can be explained only on the ground that these bacteria were active invaders, acting injuriously on the host. Improvement was brought about by increasing the opsonins in the blood. As this action is specific, we are amply justified in holding that these secondary bacteria took an active part in the evolution of the disease and the causation of symptoms.

Conclusions.—While we have much to learn concerning the rôle played by mixed infections in pulmonary tuberculosis, the evidence seems to justify the conclusion that such infections modify the course of the disease injuriously, being the causative factors in some of the grave accidents, or aiding in their production, and tending generally to shorten life. In many cases they appear to be the direct and immediate cause of death.

DISCUSSION.

Dr. Bernard (Paris) asked under what conditions, and particularly at what lapse of time after death, Dr. Ravenel's observations had been made, in regard to his statements that the organisms of secondary infection could be found outside of the limits of the tubercle bacillus, as seen in microscopical sections; because their experience in France, and particularly the work of his colleague, Auclair, had demonstrated that Koch's bacillus was specific in its pathological action, and in itself could, and did, cause all the lesions seen in tuberculosis.

Dr. Ravenel answered that his autopsies had been made from four to twelve hours after death, and that the bodies had been kept on ice. He would admit that the tubercle bacillus could, by itself, cause all the lesions of tuberculosis; but that, nevertheless, in his opinion, certain lesions, particularly the more advanced ones of destructive character, were in reality due to the secondary organisms. He recognized the fact that his paper could not claim to be very positive in this matter, but he would remind the audience that the whole question was an extremely difficult one, and that the present state of our knowledge was uncertain. For himself, he recognized that a great deal of work, in his own case, had gone for comparatively small result.

THE DURATION OF THE ACTIVELY INFECTIOUS STAGE OF TUBERCULOSIS.

By Robert N. Willson, M.D., and Randle C. Rosenberger, M.D.,
Philadelphia.

The object of this study has been primarily to render a rich field of tuberculous material of practical value from both the clinical and laboratory viewpoints. Scant benefit accrues to humanity at large from scientific knowledge that cannot be applied to its betterment or protection. We have endeavored, through scrutiny of the secretions and excretions of tuberculous subjects, to arrive at definite conclusions—(1) with regard to the possibility of transmitting the disease during its earliest stages; (2) as to what means, and through what media, infection of human beings by other individuals may and does occur; and (3) as to how far and how thoroughly, under the ordinary circumstances of daily life, nature provides for the destruction of infectious tuberculous material, subsequent to its excretion from the human body.

It has been, and as the result of this investigation still more certainly is, our conviction that tubercular infection may and does not infrequently occur through the semen; whether or not by means of the spermatozoon as the host and carrier of the tubercle bacillus remains to be determined. Such a mode of infection does not, of course, require the immediate appearance of a symptom-complex of tuberculosis, as we know it clinically. That the disease may be implanted prior to birth needs as witness only the occasional congenital caseous pneumonia, included in the experience of every pathologist of ordinarily wide opportunity. Veterinarians and plain farmers add a homely proof also in the not infrequent dropping of a tuberculous calf by a tuberculous cow—evidence to the same effect from the lower animal kingdom. John R. Williams* cites a case of almost certain placental transmission. Harbitz† has recently reported five cases of congenitally tuberculous twins, and has demonstrated the presence of latent bacilli. Kraemer‡ relates a number of instances in which the father is tuberculous,

* Jour. Am. Med. Assoc., April 6, 1907.
† Untersuch. über Tuberculose, Kristiania, 1905.
‡ Beiträge zur Klinik der Tuberculose, ix, No. 2, 1908.

and all the children die of the disease, the mother remaining perfectly well. Every physician knows of at least one such occurrence. It is, in fact, our unhesitating belief that many, if not most, cases of so-called predisposition, or post-natal infection, with tuberculous parentage, are illustrations of latent tuberculosis—the result of intra-uterine infection. Such transmission, whether maternal or paternal, reveals its secrets in response to only one line of investigation, and this offers difficulties, and leads to conclusions that are not by any means clear-cut nor final. There have come to us during the past four months eight opportunities for autopsy upon men dying in the Philadelphia General Hospital from tuberculosis in advanced stages. From each of these subjects the testicles and two inches or more of each vas deferens were removed as soon as possible after death. The duct was carefully dissected from the surrounding tissues, and by sterile scissors cut across about one inch from its junction with the testicle. By gentle pressure from the testicle outward along the duct were expressed from one to two small drops of clear semen, which was at once applied to clean glass slides, spread, and stained for tubercle bacilli, decolorizing and differentiating with Pappenheim's solution of rosolic acid in alcohol. The fresh specimen was first examined for live spermatozoa, but in no instance were they found in motion. In all, fifteen specimens of semen were examined (from eight subjects).

Case I: General tuberculosis. Testicles and epididymis appeared normal. Semen from right testicle and duct shows no bacilli. Semen from left side also negative.

Case II: Tuberculosis of lungs, cavity formation. Testicles and ducts appear normal. Semen from both sides fails to show bacilli.

Case III: Empyema. Caseous pneumonia of left lung. Right lung less involved. Sputum full of bacilli. Semen from right testicle and tube yields one typical tubercle bacillus. Semen from left side shows no bacilli. Testicles and duct appear normal.

Case IV: Chronic ulcerative pulmonary tuberculosis. Tuberculous enteritis, ulcerated mucous membrane of appendix. One testicle only present. Semen from normal appearing testicle and duct yields three typical tubercle bacilli.

Case V: Chronic ulcerative tuberculosis of the lungs. Semen from normal appearing right testicle and duct shows a few typical tubercle bacilli. No bacilli found in semen from left side.

Case VI: Caseous pneumonia. Tuberculous enteritis and cystitis. Testicles and ducts appear normal. Semen from right side shows one tubercle bacillus. None in semen from left side. Testicles appear normal, also the ducts.

Case VII: Chronic ulcerative tuberculosis of both lungs. Caseous pneumonia of left lung. Testicles and ducts appear normal. No tubercle bacilli found in semen from either side.

Case VIII: Case from insane wards. Amœba coli in stools. Tuberculous cavity in right lung and pneumothorax. Tuberculous ulceration of intestines. Feces full of tubercle bacilli. One tubercle bacillus found in semen from each side. No macroscopical involvement of testicles or tubes.

Thus in a series of eight cases tubercle bacilli were found by simple staining methods in five instances, and in the semen from five out of fifteen testicles. The fact that the bacilli were usually found, if at all, in the semen from only one side, would rather give force to the belief that there was local tuberculosis of the corresponding organ or duct, though not macroscopically evident. This fact would not, however, affect the question of the infectiousness of the semen, and the danger to the woman and the fetus. The fact that the semen was directly from the testicle points to the blood as its vehicle from the point of inoculation. Inoculation of laboratory animals had been projected, and will yet be carried out, and reported upon subsequently. The semen from the seminal vesicles has been used for inoculation of the lower animals by a number of investigators, and has frequently produced tuberculous infection. Karlinski* at times found the semen from the seminal vesicles swarming with tubercle bacilli. In other cases he has found it impossible to demonstrate one bacillus until inoculation experiments enabled their demonstration in the test animals. He has also injected the testicle of a healthy goat with bacilli, then has brought about coitus with the female, and studied the tuberculous progeny (five out of nine) from a healthy mother. He has noted the dropping of a tuberculous calf by a healthy cow, impregnated under isolation by an infected bull; and proved his results by autopsy. We know of no one who has used the semen obtained directly from the testicle and the first portion of the vas deferens, and shall therefore complete this study when the opportunity presents. The discovery of the tubercle bacillus in testicular semen establishes not only the possibility, but the likelihood, of frequent transmission of the disease by the male to the fetus. It also aids in establishing the more important fact that congenital tuberculosis is likely to be apparent at birth proportionately to the susceptibility of the maternal element and the developing fetus to the influence of the bacillus and its toxin. Provided they are resistant, and fully or overnourished until term, there may be nothing to indicate the presence of the latent infection.

There is no need to dwell upon the possibility of infection by means of sputum. Practical interest seems to us to center rather in the demonstration of the bacilli in other excreta of the body, to which human beings are constantly and ignorantly exposed for new or reinfection. Important also are the time of earliest infectiousness of these excreta, and their tenaciousness

* Zeitschrift f. Tiermedizin, 1905.

of virulence under favorable and adverse circumstances within and without the body.

Early Appearance of Tubercle Bacilli in Secretions and Excretions.

It is a matter of common knowledge among medical men that tubercle bacilli may be determined by staining methods in the sputum from a bronchial tuberculosis long before the chest yields definite and localizing signs. It is equally well known that a rectal ulcer may swarm the intestine with tubercle bacilli before the presence of the ulcer has been suspected. A case in point has been studied recently by us in a man who was admitted to the wards of the Philadelphia General Hospital supposedly suffering from uremic intoxication. He was comatose, his breathing stertorous, there was neither cough nor any considerable sputum, nor any symptom attracting attention to the lungs, and no diarrhea. A tiny speck of sputum was once expectorated and was found full of tubercle bacilli. The feces were then studied and showed scattered tubercle bacilli. When later the urine could be obtained, the bacilli were also demonstrated in the sediment. There had been no suspicion of tuberculosis prior to the examination of the stray mite of sputum and the feces. The case was infectious to others without doubt for days, perhaps for weeks and months, prior to the detection of the causal germs.

Although not by any means a new finding, the fact has not been generally recognized by the practitioner that in the feces and urine of most, if not all, tuberculous cases is contained infectious material; and that in these excreta the bacilli may be demonstrated with great frequency and regularity by tinctorial methods, and by animal inoculations when the former fail. The full knowledge of the value of this procedure led us to a tinctorial study of the sputum, urine, and feces, in a large series of cases known to be tuberculous; and also to a series of inoculations of animals with tuberculous material, especially such as no longer showed the bacillus by tinctorial methods. Our first step was the exhaustive examination of specimens of sputum, urine, and feces from 100 cases known by the examination of the sputum to be actively tuberculous. In all instances the smears were made upon new and thoroughly clean glass slides, long immersed in alcohol, ether, and nitric acid, then washed with soap and distilled water, and dried over the flame. Urinary sediments were usually centrifugated and washed three times with distilled water prior to fixing upon the slide. When only a small quantity of urine was obtainable (1 to 2 c.c.), the washing was dispensed with and the entire quantity of urine was placed in the center of a slide and allowed to dry in as small a space as possible, stirring it in the beginning with a tiny portion of egg-albumen. The sediments were all obtained from eight ounces of the evening urine, allowed to sedimentate over night, and

from this precipitation was pipetted off a small tube full of deposit into distilled water.

We have already mentioned the great difficulty experienced by us and by all students of urinary sediments in fixing the latter upon a glass slide. After many failures we found that two methods would invariably succeed: (1) the coating of the smear, after fixing in the flame, with a thin solution of ether celloidin; and (2) the use of a minute quantity of egg-albumen on the slide before applying the urinary sediment. The single objection to the ether-celloidin rests in its thickness, and consequent overdeep staining with the counterdye. Even with the albumin fixation one precaution is necessary; namely, that the smallest possible quantity of albumin should be used in order to avoid the difficulty in decolorizing the albumin and the albumin-fixed specimen by Pappenheim's fluid. Once these precautions are observed, no further sediments should be lost or their final beauty impaired.

The smears from the feces were in some instances prepared by dissolving a little of the stool in a test-tube of distilled water, and smearing this semi-paste in a thin, even layer upon a slide. Occasionally it was sufficient to rub a small portion of the interior of the stool into a drop of distilled water already upon the slide. There seemed to be little advantage in one method as compared with the other, though the latter affords economy of time and glassware, and was finally adopted as the method of choice. The slower method was held in reserve as slightly more thorough, to use in the event that no bacilli were found by the first procedure. In all cases the smears were stained with cold carbol-fuchsin in covered jars for fifteen minutes, and then decolorized and counterstained in Pappenheim's solution of rosolic acid and alcohol about twenty minutes. A number of specimens were allowed to remain in the alcohol rosolic acid for twelve to eighteen hours, without decolorization of the tubercle bacilli.

The following record will show the startling frequency of the presence of the tubercle bacillus in the urine and feces of admittedly tuberculous subjects in advanced stages of the disease:

Of 100 cases, male and female, from the tuberculosis infirmary of the Philadelphia General Hospital, the sputum of all chosen for experiment showed considerable numbers of tubercle bacilli.

The entire hundred also showed tubercle bacilli in the feces, a few in considerable numbers, many more but few in scattered microscopical fields, several in such scarcity as to admit of discovery only after painstaking search.

Thirty-eight of the hundred also showed the bacilli in the urinary sediments—never in considerable numbers; on the contrary, usually they were discovered after tedious study of the specimen. All negative specimens were examined for at least one hour before being considered free from tubercle bacilli. Several specimens, at first considered negative, required repeated searching, and after several hours yielded one or two bacilli.

There seemed to be no direct relation between the number of tubercle bacilli in the sputum, the feces, and the urine of a given case. Occasionally the sputum appeared richly infested, and only the last field examined would disclose a lone organism in the fecal or urinary preparation. As far as possible in this series we avoided patients with renal or intestinal tuberculosis, and the cases that came to inspection at autopsy usually bore out our judgment in their freedom from active involvement of these organs. One case in the insane wards, already referred to, had been studied for a considerable time as an instance of ameba infection. The stools showed tubercle bacilli in such numbers as to suggest tuberculous sputum rather than feces. This case died suddenly of tuberculous pneumothorax, no lesion having been suspected in the lungs, cough and sputum being absent. At the autopsy the lower bowel was found to be riddled with ulcers of a nondescript type, from the floor of which, however, we obtained many tubercle bacilli.

We had also the opportunity of examining the excretions from a number of cases of supposed tuberculosis (pulmonary) that had found their way into the tuberculosis wards, and yet had never yielded tubercle bacilli in the sputum. In not one of these cases, in which the examination of the feces and urine indicated an absence of tuberculosis, did the autopsy prove the case one of tuberculous infection.

One of us (Rosenberger) has during the past few years examined the feces from 1104 cases of all kinds (including 71 instances of known tuberculous infection), with a percentage of 26.6 of positive findings of the tubercle bacillus. Excluding the 71 instances of recognized tuberculosis, there remain specimens examined from 1033, of which number 21.5 per cent. were positive. These examinations were mostly of specimens from patients with maladies resembling tuberculosis, such as typhoid states, or even malaria. A number were from apparently healthy individuals. To assure himself that he was dealing with the tubercle bacillus alone, he mixed with feces old and young cultures (six days' and six weeks' growths) of the butter bacillus, of the bacillus of Rabinovitch, of Grassberger, of the grass bacilli of Korn and of Moeller, the horse-dung bacillus, mist bacillus, the margarin bacillus, the bacillus of nasal secretion, and the smegma bacillus. He then made spreads in the ordinary manner (after leaving the organisms in the feces for from one to twelve days), and found that all of these organisms would decolorize completely in twenty minutes. Control preparations made of sputum or feces kept in Pappenheim's solution showed the tubercle bacillus still retaining the red stain of the carbol-fuchsin after one hundred and sixteen days' exposure to the rosolic acid alcohol. Sections of tissue containing the bacillus lepræ, stained with carbol-fuchsin and then placed in Pappenheim's solution, showed the bacillus still retaining the stain up to the fourteenth day. Another organism that apparently is as acid-fast as

the tubercle bacillus is that of Johnes' disease in cattle. This resisted Pappenheim's solution for sixty days. The spread was then removed from the fluid by some one's error, and further study was interrupted.

The foregoing studies have led us to the following conclusions:

1. That in all cases of active tuberculosis, as well as in cases in which they can be demonstrated in the sputum or urine, the bacilli are present in the feces.

2. That the urine of all actively tuberculous subjects probably contains tubercle bacilli, even though in small numbers. The average scarcity in a given specimen renders the study of the urine impracticable as a routine procedure. In many specimens they are stumbled upon only when the examiner is about to give up the search, and it becomes necessary to class the specimen among the positive only by virtue of the last field examined. Certainly it would seem that former publications reporting higher percentages of urines as positively containing tubercle bacilli have included smegma bacilli among their findings. These can be differentiated either by careful catheterization, or by the use of rosolic acid and alcohol in decolorizing, or, if necessary, by obtaining the urine directly from the bladder at autopsy, as in the animals examined in our Experiments IV and V, reported in this study. Thus, Flick and Walsh* report a series of 60 cases examined, the urine of 44 of which showed supposed tubercle bacilli, by tinctorial methods, and yet out of five animals inoculated with the urinary sediment, not one developed tuberculosis. In the presence of actual and living tubercle bacilli the tuberculous urinary sediment should prove infectious for susceptible animals, as shown by Bloch,† who used in many instances urinary sediments in which the bacilli could not be demonstrated by tinctorial methods, and yet therewith successfully inoculated guinea-pigs with tuberculosis. His method was to crush the tiny inguinal glands between his fingers, and to inject the urinary sediment in the neighborhood of the trauma, in the likelihood that this area will be infected.

3. The question still remains *sub judice* whether scattered tubercle bacilli may not be found exceptionally in the feces and urine of normal subjects. It would seem rational to believe that the feces at least would contain occasional tubercle bacilli, carried into the mouth with the food or air, and thence into the digestive tract, without infecting the patient. Our investigation of apparently healthy cases has in no instance led to the discovery of the tubercle bacillus. We have knowledge, however, of at least two cases in which we have found bacilli in the feces, and in which, at autopsy, no macroscopical lesions of tuberculosis could be detected throughout the body. This does not mean, of course, that the patient may not have had an actual infection by tubercle bacilli at the time of examination of the feces and

*Proc. Path. Soc. Philadelphia, April, 1903. †Berlin. klin. Woch., xliv, No. 17.

the discovery of the bacilli. Nor does it even imply that microscopical lesions may not have been abundant. The recent experiment of Ravenel and Reichel,* as well as those of many other laboratory workers, have shown how little lesion the bacilli may cause in an intestinal wall on passage through the latter to cause a bacteriemia, and it may well be that the instances that seemed at first glance to be accidental bacilli were, instead, the only evident expressions of a latent tuberculosis.

We have also studied the spinal fluid, the fluid from thoracic effusions, and ascitic fluid from a number of cases suspected of being tuberculous. In many instances we have demonstrated the tubercle bacilli; in many not. In one man for whom we had despaired of relief from an ever-refilling ascites, accompanying a dilated heart, incision was made and, to our surprise, numbers of tubercle bacilli were found in the fluid. The patient practically recovered after the incision, and the fluid failed to return. In the remarkable case, to which we have already referred, dying of uremia, with no known or recognized pulmonary lesion and no cough, clinical recovery ensued, but the patient continued to evacuate bacilli in feces and urine up to the time he was lost to view.

Another case: C. S., Philadelphia General Hospital. Bacilli could not be demonstrated in the sputum or urine, and yet were easily shown in the feces. On physical examination this case showed a small area of doubtful consolidation at the extreme right apex.

A. W., a negro, with signs suggestive of meningitis, showed a few tubercle bacilli in his spinal fluid and very many in the feces. There were no signs of pulmonary or intestinal involvement, there was no sputum, no diarrhea.

J. K. presented a slight and probably early involvement of the right pulmonary apex. No tubercle bacilli could be found in the sputum, but were present in large numbers in the feces.

S. G., an Italian, with an indefinite febrile condition, no signs of meningitis other than a slight stiffness of the nuchæ. The spinal fluid yielded tubercle bacilli, also the feces. There was no indication of intestinal implication.

J. M. had apparently a pulmonary congestion, slight fever, both bases flat on percussion, no cough, no sputum, no diarrhea. Abdominal muscles rigid, and tubercle bacilli found in the feces. This man recovered and was discharged from the hospital, still passing tubercle bacilli from the intestinal canal.

We have also in the past year had the opportunity of studying four cases of acute miliary tuberculosis of other portions of the body than the intestines, and in which tubercle bacilli were demonstrated in the feces. Autopsy showed an intestinal tract free from ulceration in each case.

*Proc. Phila. Path. Soc., vol. x.

One instance of cervical adenitis, on its way within the last month to the operating table, presented tubercle bacilli in the feces, and no other suggestion of tuberculosis throughout the body.

The foregoing cases emphasize at least three points of interest to the practitioner and to the pathologist:

1. That instances are not infrequent in which tuberculosis of parts other than the pulmonary and digestive tracts may be demonstrated by examination of the feces.

2. That tubercle bacilli may be sometimes shown in spinal fluid, or ascitic or pleural fluid, in cases of early and localized tuberculosis other than that of the pulmonary system; and that in these cases the bacilli may be, and usually are, excreted in the urine and feces.

3. That incipient pulmonary tuberculosis may show considerable numbers of tubercle bacilli in the intestinal excretions, even in the absence of cough and obtainable sputum.

Of the infectiousness of incipient pulmonary tuberculosis there can be no doubt, even in instances that show neither cough nor sputum, provided such cases excrete tubercle bacilli in urine and stool. A number of cases have come to the attention of one of us that still further emphasize the need of supervision and care of the incipient disease. Two such may be mentioned in bare outline:

Case I: Miss B. Was reported in a series of cases of incipient tuberculosis in 1903. She had then a slight involvement of the right apex. The nature of the onset and the physical signs left little room for doubt as to the nature of the process. There was slight cough, no sputum. This young woman's sister slept with her during her convalescence, and developed a similar though more extensive involvement. Both of these cases recovered and are perfectly well. Simultaneously with the recognition of the second case, the cook in the house, with whom Case II had constant dealings as housekeeper, developed an active apical lesion. No other source of infection could be discovered for the latter two cases than Case I, whose feces contained tubercle bacilli. There were many opportunities of infecting the hands in disposing of the urine and stools of Case I.

Case IV: Miss L. Was that of a young girl presenting an early and very slight involvement of the right apex, posteriorly, in conjunction with an appendicitis, which operation and pathological study proved to be tuberculous. Tubercle bacilli could not be found in the sputum. The sister of this patient, who had been well, was her bed-fellow, and developed an active tuberculosis of the left lung and pleura, which is not yet under control. There was no apparent opportunity common to both for the infection. Moreover, the cases seemed strikingly successive, and similar in course and type. The feces of both contained tubercle bacilli.

If these are true instances of infection of healthy persons by infectious material transmitted from supposedly non-infectious cases of tuberculosis,

whether through inappreciable particles of pulmonary or bronchial material or through contamination of hands or food by moist or dry fecal or urinary soiling or dust, then it would appear that care must be exercised in a new and more active fashion in throwing safeguards around those who live with even a case of incipient tuberculosis. Seen in this light, at no date in the history of a case of infection is a rigid oversight begun too early from the standpoint of the welfare of others.

Such a conclusion, if well grounded, requires only the fact, already stated, of the presence and discovery of tubercle bacilli in the semen, and the consequent likelihood of frequent latency of tuberculosis, to render the possibility of infection of a healthy mother or family by a newly born tuberculous infant not only a possibility, but a matter of concern. Especially will this be true in a case in which the father is known to be tuberculous and the mother appears to be free.

We have had neither the opportunity nor the time as yet to study the milk from nursing tuberculous mothers. The frequency of infection of bovine milk from tuberculous cattle leaves little to be hoped in the way of a different state of affairs in the human secretion. The knowledge that pregnancy and the ordeal of child-bearing tend to light up a sluggish or dormant tuberculous condition in the mother would also lead us to believe that the tuberculous nursing mother is, above all other times, then likely to secrete and excrete tuberculous body-fluids.

Infectiousness of Old Secreta and Excreta.

We have been interested to note, in passing, the duration of virulence of the tubercle bacillus in sputum, urine, and feces, under natural conditions favorable to and unfavorable to their life. We have met with results that vary to the last degree. On June 1, 1908, six specimens each of urine, sputum, and feces, all containing virulent tubercle bacilli, were set aside in vessels covered with large-meshed gauze, and exposed for about twelve hours daily to sunlight and air. On July 1st and August 1st the bacilli in the sputum could be demonstrated without difficulty and proved specifically toxic for guinea-pigs. They took the strains readily in also the urinary sediments and in the dried fecal mass rubbed up with distilled water and smeared as usual. The specimens were then saved for further study. A few days later the bacilli could no longer be shown in two of the specimens of sputum. With material from one of these sputa a guinea-pig was inoculated (Experiment III) hypodermically, and within a few days tubercle bacilli were demonstrated in its feces, not being present there up to that time. In contradistinction to this finding we have (Rosenberger) preserved virulent tubercle bacilli in distilled water, exposed to sunlight, for a full year, then have produced tuberculosis in a guinea-pig by inoculation, and recovered

the bacilli from the animal. There seems to be no rule for the calculation of the viability of the germ under a given environment. There seems to be little doubt, however, that in process of time the bacilli must die out in any or all excreta, the time being indeterminate and impossible of regulation except by immediately destructive methods. Certainly we must conclude that the organism may persist in a non-stainable form in any or all known media, and retain its virulence for use upon a suitable occasion. It may still be that from the tubercle bacillus we shall learn the secret of perennial youth. In a recent paper Dixon* has discussed the action of direct light and eosin upon the tubercle bacillus. He seems a little more optimistic of the bactericidal influence of drying, and of the sun's rays, than appears to us warranted in the light of our experiments. There is no doubt that certain infected sputa are rendered innocuous by nature's and other simple means. It is our knowledge, and we believe that it will be a service to the practitioner, if we see that he understands that under favorable conditions, or even when exposed to air and strong sunlight, the bacillus may attain a virulent old age. The most dangerous feature of its persistence, as shown by our Experiment III, is its occasional survival in a form that requires tedious culture and refuses demonstration by tinctorial methods. This opens up an endless series of queries as to the actual presence or absence of bacilli in excreta, upon which a negative laboratory report is made, and in which neither cultural nor inoculation tests are made to determine the doubt. This masked battery will decimate more than one generation and defy defeat unless some more certain method be discovered of promptly demonstrating the silent forms of the tubercle bacillus. The almost unlimited life of the bacillus in butter, and its frequent occurrence therein, has been dwelt on with force by Schroeder and Cotton.† They have shown that after four and one-half months the bacilli were as virulent as at the start, the fatty nature of the butter probably protecting them from destructive influences. This may also lend a hint as to the length of life even in dried secreta and excreta, in certain of which enough of fatty matter is perhaps maintained to allow of their existence, while in a few or even many the fat content is low and the bacilli easily destroyed.

Origin of the Bacilli in Urine and Feces.

There need be no discussion of such instances as present local tuberculous lesions in either the urinary (kidney to urethral meatus) or digestive tracts. With regard to the appearance of bacilli in the urine of cases of tuberculosis of the glands of the neck, or of the lungs, or of the peritoneum even, there need be little hesitation in turning to the acknowledged bacteriemia for

* Jour. Am. Med. Assoc., Aug. 1, 1908.

† Circular 127, Bureau of Animal Industry, U. S. Dept. of Agriculture.

the explanation. With regard to their presence in the feces in similar cases the answer must not be so precipitate. In the first place, they may be swallowed, with food or water, or with sputa in the case of tuberculosis of the bronchi or lungs. On the other hand, our animal experiments do not lead us to believe that many bacilli introduced by the mouth become demonstrable in the feces until several days after their introduction into the stomach with the food. Having been introduced by us in the form of native sputum, we would be inclined to doubt whether they are carried into the intestines in a form that will accept the stain when swallowed by the patient as his own sputum. Certainly such a possibility must be considered. Of all the explanations, however, it now appears to us the least satisfactory. Longcope* and others have shown the frequency of tuberculosis of the thoracic duct, and the involvement of its lymph with tubercle bacilli in cases of general tuberculosis. Here at once we find at least one explanation both of the presence of the bacilli in the intestine, and of their scattering abroad from the digestive tract. The means of transmission, after all, whether one medium be the lymph and another the tissues themselves, must be the blood, if all the requirements and demands of the known facts are to be met. Once grant, as we must, that bacilli administered in soup to animals reach the heart blood in four to five hours, as Besanti and Panisset have shown in a number of experiments, we need no further explanation of the transportation of the tubercle bacilli from local lesions far distant to the manufactory of the fecal mass.

Early Appearance of Tubercle Bacilli Following Inoculation of Guinea-pigs.

It has also been our aim, through the inoculation of guinea-pigs by various methods, and by careful scrutiny of their physical signs, their secretions, and excretions, both prior to and subsequent to inoculation, to determine the earliest probable period of infectiousness in a given case of tuberculosis.

In order to arrive at as practical results as possible we not only fed to one guinea-pig tuberculous sputum spread on cabbage leaves, but into others injected tuberculous sputum in distilled water, either hypodermically or intraperitoneally.

Experiment I: Large male guinea-pig, weighing 500 gms., was fed on August 8, 1908, 3 c.c. of tuberculous sputum from a patient in the tuberculosis infirmary. Urine and feces were examined on the day prior to the inoculation, and on each day thereafter. On the day prior to the feeding a few micrococci and fungi were found in the stools and urine. On the third day after the feeding for the first time a few scattered tubercle bacilli were

* Bull. Ayer Clin. Lab., No. 3, 1906.

found in the feces, together with many tiny diplococci. The urine also contained many diplococci on the third day and thereafter, but no tubercle bacilli were discovered in the urine until the seventh day. They were constantly present in the feces from the time of the first appearance, and were occasionally found in the urine up to the time the search was discontinued. This pig was killed and autopsied on September 16, 1908. The lungs showed several small areas of caseous deposit. No other macroscopical change was evident.

Experiment II: Large brown and white male guinea-pig weighing 530 gms. Inoculated hypodermically about an inch from the tail on August 8, 1908, with tuberculous sputum from a woman in the infirmary. Feces and urine examined daily before and after the inoculation. Tubercle bacilli appeared first on the fifth day in the feces, and on the eighth day in the urinary sediment. The search was then discontinued.

Experiment III: Large male guinea-pig weighing 490 gms. Inoculated on August 18, 1908, with a solution in distilled water (1 c.c.) of a dried tuberculous sputum which had been exposed to air and sunlight for over two months, and in which the tubercle bacilli were no longer tinctorially demonstrable. Feces and urine showed no bacilli on day of inoculation or thereafter until the sixth day, when they were detected in small numbers in the feces. They were at no time found in the urine.

Experiment IV: Large male guinea-pig inoculated on September 1, 1908, intraperitoneally with 2 c.c. of tuberculous sputum and distilled water a.a. Died of septicemia on third day. Urine and feces examined on day of inoculation and no tubercle bacilli found prior to operation. The peritoneal cavity at autopsy showed a large quantity of pus and lymph. There were also scattered miliary pus foci in the lungs. The peritoneum was thickened and everywhere covered with purulent exudate. A smear from the peritoneal pus showed a very few scattered tubercle bacilli, an almost pure culture of small diplococci, and myriads of eosinophiles. The bladder was full of urine containing pus (2 c.c.). This was fixed and dried with egg-albumen on a slide, and stained. A single colony of eight tubercle bacilli was found in the preparation. They were also present in the feces obtained directly from the cecum.

Experiment V: Large male guinea-pig inoculated on September 1, 1908, with same sputum and similarly to last one. Died on fourth day, from septicemia. Urine examined before inoculation showed no tubercle bacilli. Feces also gave no bacilli. Autopsy gave same findings as in the preceding animal, except that suppurative process was not so far advanced. The lungs were congested, but showed no purulent metastases. A smear from the peritoneal pus gave myriads of small diplococci and no tubercle bacilli. The bladder contained urine, which showed in the dried and stained specimen a few scattered tubercle bacilli. The feces also contained scattered single tubercle bacilli.

Conclusions.

1. That intrauterine tubercular infection through the semen is probably a frequent event.

2. Tubercle bacilli are present in the feces and in the urine of many,

and probably all cases of active local and systemic tuberculosis of the human being.

3. Tubercle bacilli appear in the feces and urine of tuberculous subjects within the first few days following an acute infection, and in certain instances long prior to the appearance of physical signs.

4. The only likely means of rendering tuberculous excreta (sputum, feces, urine) innocuous is the direct and effectual application of heat. They cannot be expected to certainly overgrow, or die out, or surely to succumb to sunlight or drying.

5. Excreta from which formerly demonstrable tubercle bacilli have apparently disappeared may still prove destructive to animal life, and the bacilli again be recovered from the test animals in a demonstrable form, both by culture and by tinctorial methods of examination of the excreta.

6. The routine examination of the stools for tubercle bacilli should be more invariable even than that of the sputum. It more often yields a positive result. In occasional instances the microscopical field is as thickly spread with the bacilli as any sputum. Often the search must be painstaking and extended until a few scattered bacilli have been detected.

7. The examination of the urinary sediment for tubercle bacilli is not adapted to the general practitioner. It should be resorted to whenever necessary to a thorough confirmation of suspected and doubtful or local (genito-urinary) infection. The inoculation of guinea-pigs with the urinary sediment is a surer though slower method of demonstrating the bacillus, provided the test animal escapes early death from mixed infection.

8. Probably all infections will open up to similar methods of study of their causal organism, when once we have determined upon specific stains and differential methods. There appears to us to be little doubt that every bacterial infection is a bacteriemia, and it seems not improbable that in every bacteriemia the causal organism is excreted through the urine and the feces.

Significance of the Foregoing.

The import of this and of similar studies by other investigators is at once vital in its bearing upon society at large. The physician is confronted with the certainty that he has no more than begun the crusade against tuberculosis. He has perhaps even overestimated the possibility of its complete ultimate control. Without the slightest desire of uttering a pessimistic word, and with the knowledge that in the clearest understanding of the truth lies its best hope of accomplishment—on the basis of this study we feel dubious as to the ultimate extinction of the disease by human means. No more likely is it that the discharges from the typhoid, or cholera, or dysenteric patient will always or even usually (except in hospitals) be effectu-

ally destroyed, and thus prevented from polluting the air we breathe and the drinking supply, than that tuberculosis shall more than be inhibited in its spread. Granting, as we now must, that the infection is scattered broadcast for days and weeks, and perhaps months, before signs and symptoms demand a study of the case, it can be seen at a glance into what a labyrinth wanders the quest for its extermination and control. Urine, sputum, and feces, all virulent,—whether wet or dry,—and for an indefinite time, the very indefiniteness of which renders them positively antagonistic to the health of the community until it or some equally positive destructive force places the sufferer under the sod. The studies of Lord* have shown us that one fly-speck may contain as many as 5000 tubercle bacilli; further, that 30 infected flies deposit in three days from six to ten million tubercle bacilli. We are therefore starting some centuries late in the destruction of flies. Fridemann has injected tubercle bacilli into the vagina of a guinea-pig just after coitus, and later demonstrated the bacillus in the embryo. We not only have on our hands the destruction of insects, but the prevention of marriage among the tuberculous. And yet, in spite of this knowledge that urine, and feces, and sputum, and semen, all carry, under favorable conditions, the certainty of a spread of the disease, in future, rather because than in spite of this, there will be disinfected many an otherwise ignored or neglected source of contagion.

In so far as we arrive a step nearer a comprehensive realization of the armament, the subtlety, and the ubiquity of tuberculosis; in just the proportion that our effort at control is relentless and systematic—in just that measure will we render a dayspring of true health conceivable, and lighten with hope the toilsome burden of man.

Durée de la Période activement infectieuse dans la Tuberculose.—(Willson et Rosenberger.)

Étude au point de vue clinique et au point de vue du laboratoire fondée sur l'abondante matière tuberculeuse dans le Philadelphia General Hospital. Examen dans tous les cas, autant que possible (examens complets dans 100), des urines, du sputum et des fèces, et souvent aussi du sémen, du sang, du fluide cérébro-spinal, et d'épanchements thoraciques et abdominaux. Dans la grande majorité des cas les bacilles de la tuberculose furent démontrés dans au moins une, et généralement dans les trois principales excrétions, parfois dans tous les fluides de l'organisme, y compris 5 parmi 8 cas dans lesquels les bacilles se trouvèrent même dans le sémen à l'autopsie. Dans tous les cas où les bacilles furent démontrés, soit dans l'urine soit dans le sputum, ils se trouvèrent aussi dans les fèces; de même dans bon nombre de cas dans lesquels le processus tuberculeux relevait du type miliare aigu ou bien dans lesquels il paraissait être strictement localisé (ganglionnaire, par exemple).

* Publ. Mass. Gen. Hosp., 1906, vol. i.

La viabilité du bacille dans le sputum, les urines, et dans les fèces se trouva très-variable, surtout lorsque la désiccation de ces matières se fit en plein soleil. Dans tous les cas ce ne fut qu'au bout de bien des jours que les bacilles disparurent et dans l'eau leur vie se prolonga plus d'une année. La durée de l'infectivité des excrétions, même quand elles étaient desséchées, était sans limite, ou à peu de chose près. Bien que dans certaines préparations les bacilles resistassent les procédés tinctoriaux, la maladie se communiqua néanmoins dans tous les cas aux animaux susceptibles.

On fit des inoculations chez le cobaye pour déterminer le premier moment que les bacilles paraissent dans les excrétions après l'infection des animaux par la voie alimentaire, par l'injection hypodermique et par l'injection intrapéritonéale. Des exemples de tuberculose pulmonaire au début chez l'homme et des cas de tuberculose dans d'autres parties du corps, qui ne sont pas en communication avec l'atmosphère, sont cités pour démontrer que les urines et les fèces sont infectieuses presque depuis le commencement de la maladie. Dans toutes les expériences sur les animaux les bacilles furent démontrés dans les fèces et dans les urines avant la fin de la première semaine, dans la plupart des cas avant la présence soit de tousse, soit de crachements.

Les auteurs insistent sur l'importance de la présence de bacilles vivants dans les urines et dans les fèces, dans tous les cas de tuberculose, que ce soit le système genito-urinaire, intestinal, respiratoire ou autre qui est atteint. Ils signalent aussi la protée de leur présence sur l'infectivité des immondices (égouts) et de l'eau. Nécessité d'empêcher la propagation de la tuberculose par le moyen de ces voies, qui actuellement ne sont pas surveillées, si on espère jamais supprimer la maladie.

Die Dauer des activ infektiösen Stadiums der Tuberkulose.— (Willson und Rosenberger.)

Die Autoren haben den reichen Stand an tuberkulösem Material in dem Philadelphia General Hospital vom klinischen und Laboratoriumsstandpunkte aus studiert, indem sie in jedem Falle (100 Fälle vollständig) womöglich den Urin, das Sputum, die Stühle, oft auch den Samen, das Blut, die Spinalflüssigkeit und Brust- oder Baucheffusionen untersuchten. In einer grossen Mehrheit von Fällen konnten die Tuberkelbazillen in mindestens einer, und für gewöhnlich allen dreien der Hauptexcretionen nachgewiesen werden, und gelegentlich in allen Körperflüssigkeiten, einschliesslich fünf aus acht Fällen, in welchen sogar der Same die Bazillen bei der Autopsie enthalten hatte. Die Bazillen wurden in jedem Falle in den Stühlen nachgewiesen, in welchen sie entweder im Sputum oder im Urin gefunden worden waren, und in vielen Fällen, in welchen der tuberkulöse Prozess von akutem Miliartypus war, oder scheinbar von genauestens lokalisierter Natur (in Drüsen, etc.).

Die Dauer der Lebensfähigkeit des Bazillus im Sputum, Urin und den Stühlen war als sehr verschieden befunden worden, besonders wenn man es in vollem Sonnenlichte trocknen liess. In jedem Falle vergingen mehrere Tage, bevor die Bazillen verschwanden und unter Wasser fand man, dass sie sogar ein Jahr lang leben konnten. Es war sozusagen keine Grenze für die Dauer der Infektionsfähigkeit selbst der getrockneten Excretionen zu bestimmen. Obgleich bei einigen Präparaten nach der Zeit von wenigen Wochen die Bazillen den Färbungsmethoden Widerstand leisteten, war doch von allen die Krankheit auf empfängliche niedere Tiere übertragen worden. Es wurden Inokulationsexperimente an Meerschweinchen vorgenommen, um das früheste Auftreten von Bazillen in den Excretionen, einer Infektion durch Fütterung folgend, ebenso gut als durch subkutane und intraperitoneale Injektion zu erreichen. Es wird auf klinische Beispiele vom Beginn der Lungentuberkulose in menschlichen Wesen, auch auf Tuberkulose in anderen Körperteilen als den mit der Luft in Verbindung tretenden hingewiesen, um die Ansteckungsfähigkeit des Urins und der Stühle nahezu vom Beginn der Krankheit an zu zeigen. Bei allen Tierexperimenten wurden die Bazillen in den Stühlen und im Urin während der ersten Woche nachgewiesen, in den meisten Fällen bevor entweder Husten oder Sputum auftrat.

Es wird besondere Betonung auf die Wichtigkeit des Vorhandenseins lebender Bazillen im Urin und den Stühlen aller Fälle von Tuberkulose gelegt, entweder des Genito-Urinaltraktes, der Eingeweide, des Atmungs- oder irgend eines anderen Systems, und das Gewicht ihrer Anwesenheit auf die Ansteckungsfähigkeit der Hausabfälle und der Versorgung mit Trinkwasser. Die Aufmerksamkeit muss energisch auf die Notwendigkeit der systematischen Verhütung der Verbreitung der Tuberkulose durch diese jetzt unbewachten Kanäle gerichtet werden, wenn die Krankheit jemals unter Kontrolle gebracht werden soll.

SECTION II.

Clinical Study and Therapy of Tuberculosis—Sanatoriums, Hospitals, and Dispensaries (*Continued*).

SECOND DAY. MORNING SESSION.
Tuesday, September 29, 1908.

DIAGNOSIS AND TREATMENT OF EARLY CASES OF TUBERCULOSIS.

The second session of Section II was called to order at half-past nine on Tuesday morning, September 9, 1908, by the president, Dr. Vincent Y. Bowditch, who announced the first part of a symposium on The Diagnosis and Treatment of Early Cases of Tuberculosis.

COMPARATIVE IMPORTANCE OF TREATMENT IN SANATORIUMS NEAR AT HAND AND AN ENTIRE CHANGE OF CLIMATE.

By Dr. Frederick I. Knight,
Boston.

In former times the treatment of pulmonary tuberculosis was directed largely to allaying the cough, not only by medicine, but, when a change of climate was thought advisable, one was selected for its known sedative influence on the concomitant bronchitis and cough. Latterly, treatment has been directed to the individual affected rather than to his disease, that his body may be so strengthened as to resist the disease; and only secondarily to the symptoms and complications which present themselves. Modern success in treatment is due chiefly to improved hygiene, an important factor in which is a change in meteorological conditions, from those indoors to those in the open air, from impure to pure air. That a pure quality of any element necessary to the continued existence of life must be of great advantage to the economy needs no argument. Dr. Dio

Lewis,* of Boston, said nearly fifty years ago, quoting Drs. James Blake and Jackson as advising consumptive patients to sleep out of doors, "No doubt the lives of thousands might be saved by destroying their houses and compelling them to sleep in the open air."

One of the questions for our consideration to-day is the "Comparative Importance of Treatment in Sanatoriums near at Hand and an Entire Change of Climate." What is sanatorium treatment, and what is climate? Sanatorium treatment is simply the most thorough method of subjecting a patient to proper meteorological, hygienic, dietetic, and any therapeutic measures thought desirable, including regulation of mental and bodily exercise. Climate is the average weather conditions of a given place. We cannot, therefore, properly compare "sanatorium" and "climatic" treatment, because the climatic element is simply a factor of all treatment—of sanatorium treatment as well as of all others. It would be comparing the whole with one of its parts. It has been claimed by some modern enthusiasts that varying meteorological conditions may be disregarded in the treatment of tuberculosis, that the climatic factor may be ignored in all cases. This strikes me as contrary to experience, as well as contrary to common sense. Many of the effects of climate on the human system are well known, and there is no reason to suppose that the tuberculous patient is exempt from the ordinary laws of nature in this respect.

If it is admitted that varying meteorological conditions affect metabolism, it would seem to be hardly necessary to advance any further argument in favor of change in certain tuberculous cases. There is nothing known in a tuberculous patient to make him specially immune to climatic conditions. Dexter† says: "Varying meteorological conditions affect directly, though in different ways, the metabolism of life. By metabolism of life I mean those processes of oxidation either within the lungs or other tissues of the body which are the chemical basis of life as we know it." Sickness and death, without doubt, due to some pathological condition of the body, and any pathological condition is but a derangement of its metabolic processes. Even if this derangement may be due immediately to the action of some germ, any variations in the activity of the processes which are shown to be clearly related to differing meteorological conditions must be attributed to the effects of these conditions either upon the germ or upon the organism supporting it. Since germs have been proved to be such hardy little creatures, we are forced to suppose the effects to be upon the organism.

Huggard‡ claims that, in regard to climate, therapeutically the most fundamental point is its action on tissue change, and that its action on tissue change depends on its heat-abstracting powers; that these depend

*"Atlantic Monthly," 1863. †"Weather Influences," New York, 1904.
‡"Handbook of Climatic Treatment," London, 1906.

not on temperature alone, but on temperature in combination with humidity and the amount of wind; and that the best climate for a person is that where nutrition is at its highest level, and nutrition is at its highest level when the demand for tissue change—the demand for the production of heat—best coincides with the patient's power of response. Hence a climate which is stimulating to one is depressing to another, and therefore the necessity for careful selection.

In commenting on this statement in a communication to our National Association two years ago, I said that though we may not be willing to accept this broad generalization, yet there seems no doubt that the abstraction of heat is an important factor in metabolism; and temperature, amount of moisture in the air, and wind have certainly much to do with the abstraction of heat.

If the proposition is as to the relative merits of sanatorium regulation near home, and an unrestrained, unregulated life under radically changed climatic conditions, the choice would usually be for the former. The benefit of the sanatorium, wherever situated, is that the proper treatment, dietetic and hygienic, and medicinal if necessary, can be more effectually carried out. In the case of the poor, especially, rest, physical and mental, food, and means of taking the "fresh-air cure" are furnished, which are impossible at home. I well remember a remark, pertinent here, of that wise man, Dr. Austin Flint, forty years ago, in regard to the cases of pulmonary tuberculosis admitted to Bellevue Hospital: "It makes no difference," said he, "what medicine we give, some or none, they will all improve after admission on account of their changed conditions of life."

In the case of well-to-do patients, sanatorium treatment is of great educational benefit, and usually fulfils all the conditions of modern hygiene better than regulation of life in any home. There are few patients who would not do better to begin their treatment in a sanatorium, or in a private cottage near a sanatorium, where the same supervision and the same spirit and discipline are maintained.

I regret to notice that in some quarters sanatorium treatment is rather losing in repute. This is due largely to false expectations of the results to be obtained from it. These expectations are usually due to the exaggerated ideas, perhaps more popular than professional, of what was accomplished in the sanatoriums. The large percentage of cures or arrested cases reported from sanatoriums had an unfortunate effect, as many of these patients, on returning to adverse conditions, suffered relapse. Much, however, is now being done to correct this result, both by a gradual inuring to work before leaving the sanatorium, and by proper supervision after leaving it.

Now, this change of weather conditions from indoors to outdoors at home (practically change of climate) effects its purpose in many cases,

but not in all. In some an "entire change of climate," *i. e.*, a radical change in outdoor meteorological conditions, may be desirable. Good judgment, however, must be used in selecting new conditions, for, as Huggard found out at Davos, the same degree of cold which whets the appetite and improves digestion in most people, causes symptoms of indigestion in others, which does not pass off until the warm weather of spring appears. After a radical change of climate, treatment should be just as strictly supervised in the new location—in a sanatorium, if possible.

The relative importance of the climatic factor in the treatment of tuberculosis, and the indications for selection of meteorological conditions for any given case, will only be determined by the collation of a large number of statistics of patients in all parts of the world, diagnosticated, examined, and similarly treated by experts, who use the same classification and nomenclature, and have the same ideas in regard to their interpretation.

In conclusion, in my opinion, the sanatorium treatment is the best means for treatment of a large proportion of cases of tuberculosis, at least in the beginning. In a certain number of cases improvement is much facilitated by a radical change in the climatic factor, not necessary so often in the colder regions as in the depressing conditions of warm or hot ones.

La importancia comparativa entre el tratamiento cerca del lugar y un cambio completo de clima.—(KNIGHT.)

Los modernos tratamientos de la tuberculosis dirigidos hacia el individuo afectado mas bien que al tratamiento de la enfermedad. El tratamiento en los sanatorios es simplemente el metodo mas eficiente del tratamiento propio de los pacientes. El tratamiento en los sanatorios no puede compararse extrictamente con el tratamiento climatologico. Si la proposicion se presenta entre el merito relativo del tratamiento en los sanatorios cerca del lugar y el tratamiento de un cambio completo de clima, la preferencia debera darsele al primero.

El estado presente del tratamiento en los sanatorios. Un cambio radical de las condiciones climatologicas es algunas veces necesario á causa de los efectos de estas en el metabolismo, mas el valor relativo de los factores climatologicos se determinan solamente por medio de una comparacion cuidadosa de las estadisticas hechas en las diferentes partes del mundo.

COMPARATIVE IMPORTANCE OF SANATORIUMS, AND OF HOME, AND OF CLIMATIC TREATMENT.

By Dr. C. Theodore Williams,
London.

The sanatorium is undoubtedly the model for the life of a consumptive, for there he learns what to do, what to avoid; he is shielded from the turmoil of business life, obliged to spare his brains and to work his muscles when desirable. His food, drink, clothing, and air-supply are all regulated for him, and his business is to do as he is told. In the great majority of cases he soon finds himself improving, in spite of ennui and of uncongeniality of surroundings. Fever subsides, cough and expectoration diminish, night-sweats disappear, appetite improves, weight is gained, and the patient feels his strength gradually increasing, and day by day is able to accomplish more.

But he has to learn, and after sundry hard struggles he recognizes that obedience to orders is the only condition of his improvement. For the successful treatment of the working classes the sanatorium seems indispensable, as it is difficult, in many of their homes, to carry out sanatorium treatment. It is highly desirable to give patients of this kind such a training in a sanatorium as will convert them into apostles of fresh air and wholesome living, and opponents of all the sins against hygiene and common sense which produce physiological misery and tend to decay and death.

We must never overlook or minimize the educational effects of sanatoriums, which tell most strongly and work most beneficially on the laboring classes.

Ignorance and prejudice die hard, but I am under the impression that the teaching of consumption hospitals and of sanatoriums is telling gradually on this class in England, for it has been noticed that working men and women are becoming more accustomed to sit by the open window to read their papers in preference to crowding over the fires and stoves.

Considering the march of sanitation in most countries, especially in our large cities, we may look forward to the time when the whole population will be provided with wholesome dwellings, with the proper amount of cubic space per head, and our great object should be to educate working men and women to turn these advantages to the best account. As I have before said, I am hopeful in this matter from what I have noticed among hospital and

sanatorium patients during the last ten years. It will, however, take a long time to eradicate fears of drafts and love of stuffiness, of tobacco smoke and fog, and to bring home to them the blessings of abundant pure air.

But while we find these difficulties with adults, it is not so with the children, who are, or ought to be, instructed in modern hygiene and taught how to live, and in these must be our hope.

For the working classes I always advise residence in a sanatorium first, partly for treatment and partly for education. With regard to the relative advantages of sanatorial and of home treatment for the wealthier classes, I think with a country residence in a garden and with suitable surroundings, especially if a medical man can visit regularly and a nurse's services be available, open-air treatment can be, and often is, thoroughly carried out at home. I have a number of cases of early phthisis where complete arrest has taken place under these and even under worse conditions. I remember an actress, aged twenty-five, with a cavity in one lung, who for months lived in a tent in a garden in Barnsbury, a not very airy suburb of London, and carried out open-air treatment. She recovered sufficiently to return to her profession.

The great difficulty in the hygienic life of a consumptive at home is that practically the patient must often have separate apartments, for the open-air system, though it gives life to the tubercular daughter, adds to the sufferings of the rheumatic mother, and hurries to his last resting-place the bronchitic father; so that the girl must have her own quarters, where her proper régime is pursued.

My custom, however, with the wealthy also, where it is possible, is to advise them to enter a sanatorium for three months or even longer, and that to obtain, by observation and example, that education in sanatorium life which will inspire the faith necessary for its successful application.

Climatic treatment in early cases of consumption is a subject which I have long studied, and I have formed decided conclusions as to what cannot be accomplished.

Some years ago it was the fashion, especially among many of the sanatorium doctors, to say that the sanatorium treatment of consumption was the important element, and treatment by climate was of no importance; and, further, that for the sanatorium treatment pure air and no particular climate is required.

But it is impossible to ignore the evidence of Archibald Smith, Guilbert, Jourdanet, Hermann Weber, and others, who demonstrated beyond all question that in the climate of the Andes and the Alps cases of well-marked phthisis have completely recovered, without the advantages of the nursing and feeding and of the regulated life prescribed in a sanatorium. As an

extreme instance, take Guilbert's example of the Swiss clockmaker which I have quoted in one of my works.*

A Swiss clockmaker, aged twenty-seven, who had lost both parents from consumption, was attacked with cough and large hemoptysis, followed by loss of flesh and night-sweats. He was recommended a change of climate, and accordingly repaired to America, and set up a watchmaker's shop at Panama, a low-lying town situated on the isthmus of that name. Here the disease progressed, and, following advice, he traveled to Quito in the Andes, 9500 feet above the sea-level, where he remained six months, at the end of which period he had regained his original weight, lost the fever and night-sweats, and had an excellent appetite and scarcely any cough. He returned to Panama and led a temperate and moderate life, but after some months the cough, night-sweats, and fever all returned, accompanied by diarrhea and wasting. A second visit to Quito was recommended, and carried out with the same favorable results, and a return to Panama with the same unfavorable ones.

A third journey was then made to Quito, where he remained nine months, and was strong enough to visit some of the higher mountains of the range, though it is not recorded that he performed any mountaineering feats. He returned to Panama so well that he had a firm conviction that he was cured, but he never lost his cough, and a recurrence of symptoms soon drove him to the heights. This time he chose Arequipa, a town of 8500 feet altitude above the sea, and here for the fifth time he regained his health, but with a strange fatality he quitted the mountains and retired to Tacua, a city in Peru at a considerably lower level. Some time afterward Dr. Guilbert examined him and described him in a state of terrible emaciation, looking more like a corpse than a living being, suffering from fever and night-sweats, with entire loss of appetite, with diarrhea and a troublesome fistula in ano, and having severe cough and expectoration. He also detected the existence of cavities in both lungs and scattered crepitation at the bases, and, having prescribed palliatives, he quitted the patient under the impression that he would see his face no more. But he was mistaken.

Dr. Guilbert ascended to La Paz, the capital of Bolivia, at an altitude of 13,500 feet, and here shortly afterward the patient turned up, having followed his doctor more slowly, and now astonishing him by his rapid improvement. The fever, sweats, and diarrhea had all disappeared; the appetite had returned; the expectoration had diminished, and during some excursions they made together the patient is reported to have walked as well as the doctor, and to have been free from the "soroche," or mountain sickness, which is troublesome to newcomers in these parts. The cavities remained unchanged. Thus for the seventh time the Andes rescued him

*"Influence of Climate in Pulmonary Consumption."

from the jaws of death, and all would have been well if he had clung to them.

Unfortunately, he returned to Europe and Neuchâtel on private business; the disease made fresh progress; he was ordered to Eaux Bonnes, and died there a few days after his arrival.

Few more powerful instances of the arresting influence of mountain climates can be adduced than this one. Here was a desperate case of a patient who enjoyed no advantages of food, nursing, medicine, or regulated exercise, and it shows what the power of climate can accomplish.

If you take the trouble to consult my statistics of consumptives treated at high altitudes, you will find that they are most favorable.

In a discussion like the present the introduction of statistics is not desirable, and the best course is for a physician to state his conclusions, or, better still, his convictions.

My conviction, based on forty-two years' experience of various forms of treatment of consumptives, is the following:

If a young man or woman has a tubercular lesion limited to one or both apices, with tubercle bacilli in the sputum and a consumptive history of some months, but is devoid of fever, though not of other symptoms, that patient, after six months' residence at a high altitude under medical supervision and with proper conditions of good food and exercise, will, as a rule, return home with the disease arrested, *i. e.*, his cough and expectoration will have ceased and no tubercle bacilli be detected. All symptoms will have passed away, the ordinary standard of body-weight will have been recovered, and all physical signs will have disappeared so completely that it may be difficult to determine on which side of the chest they formerly existed. The respiratory sounds will be clear and good, and ofttimes are found to have extended their limits and to be audible lower down and higher up than in the normal chest.

The circumference of the thorax at different levels increases 2, 3, or $3\frac{1}{2}$ inches, and the mobility of the chest-wall is augmented. The patients return home in excellent health and, as a rule, do not relapse.

Cases of more extensive disease I would place under sanatorium treatment, either in an institution or at home, and I would always give them the benefit of good climate and especially plenty of sunshine, as besides promoting the various chemical and physiological phenomena necessary to good health, sunshine raises the spirits and encourages an outdoor life. I am only dealing with the treatment of the early stages of pulmonary tuberculosis, and do not attempt to discuss the climatic treatment of the more extensive and advanced cases.

THE COMPARATIVE VALUE OF CHANGE OF CLIMATE AND OF TREATMENT IN SANATORIUMS NEAR AT HAND IN CASES OF PULMONARY TUBERCULOSIS.

By Carroll E. Edson, A.M., M.D.,
Denver, Colorado.

Before entering upon any discussion of the relative value of change of climate and of treatment in sanatoriums near home in the cure of pulmonary tuberculosis, it is desirable to have a clear understanding of the principles of that cure and a common definition of terms.

The arrest of pulmonary tuberculosis is brought about through the tissue and physiological resistance to the tubercle bacillus and its products. At present our means of curing the disease are only those which perfect, maintain, increase, or exalt this resistance. The essentials to this cure are: (i) an outdoor life in pure air and sunshine; (ii) abundant nutrition; (iii) rest.

(i) An outdoor life does not mean the casual or occasional being out of doors, but implies a constant life in the open air. The measure of its efficiency is directly in proportion to the number of hours spent daily in the free air. It is not simply the being out of doors for recreation; but it is the spending of the patient's time, so far as possible, in fresh, open air, not only while at work or exercise, but while at rest, and particularly during the period of sleep.

(ii) By abundant nutrition is meant the fullest attainable measure of accomplished nutrition. This does not consist—as is too often supposed, if we may judge from dietaries recommended—in the ingestion of inordinate amounts of food, but in the maximum of digested, absorbed, and utilized nutriment. To its accomplishment, therefore, every attention to the patient's metabolic processes is important. The amount and character of his food must be controlled, and a careful watch kept of his digestive processes, that they be kept at maximum efficiency, but never overtaxed. The fullest oversight of his elimination—through bowels, kidneys, and skin—is essential. While abundance of food is important, it is the physician's duty to see that this abundance is made physiologically active.

(iii) The importance of rest cannot be overestimated, but it must be

always considered in respect to the tissue demands and physiological state of the individual patient. It is a relative term, and will vary, therefore, from confinement in bed over long periods to such graded and controlled exercise as may finally approach to full measure of work. Under the heading of rest may be included not simply the regulation of muscular exercise, but the control and supervision of intellectual and emotional activity—factors of far-reaching effect upon the circulatory and nervous balance of the patient. The clinically experienced phthisiologist needs no warning upon this point; but in actual practice this aspect of the question of rest is too often neglected. In the mental and moral realm there is the same need as in the muscular for a judicious grading from idleness to full activity.

At the present time all other measures are but adjuvants to these three factors—useful in different degrees, but not replacing them. Various remedies may assist in bringing about the desired gain through improving appetite, digestion, absorption, and elimination; or securing rest by allaying pain and cough, or equalizing the expenditure of circulatory and nervous energy. As such, they may in special cases be of paramount importance; but they are not fundamental.

The serums and tuberculins, useful as they are in selected cases, and promising as their future now seems, must still be considered as experimental and subsidiary to the other measures mentioned. Their present position in our armamentarium will be presented to you by others in this symposium.

Finally, close and prolonged medical supervision is also essential to insure the patient's gaining the maximum benefit from, and due proportion of, these factors of outdoor life, food, and rest.

While every case of pulmonary tuberculosis should be given the full measure of all of these, it does not follow that there is equal need of each. One patient will be in far greater degree helped by securing the proper rest, his nutritive life having been well balanced previously; while another will stand in urgent want of food, or be wholly untrained to any appreciation of the uses of fresh air.

It is in securing this closer watch and control of the patient's minute needs that sanatoriums have been so useful and have accomplished so much, not only for their patient's good, but toward our better understanding of the history of the disease and its natural proper management. In the interest and attention given during the last few years to the problem of tuberculosis much confusion has arisen as to the benefits derived from sanatorium treatment. The undoubted gains reported from institutions in one city have been contrasted with statistics of patients sent away to a different climate, and arguments drawn in favor of or adverse to the one or the other. The place of the sanatorium in the care of the tuberculous will

be the subject of another speaker to-day, and I shall not enter upon its consideration. For the present discussion it is important to bear in mind the unreliability of statistics to settle such a dispute, by reason of the varying and often incomparable factors composing the data, together with the well-known fact of the spontaneous healing of pulmonary tuberculosis. This difficulty has been most fully and excellently discussed by Dr. Bulstrode in his report "On Sanatoria for Consumption and Certain Other Aspects of the Tuberculosis Question," "Thirty-fifth Annual Report of the Local Government Board, 1905–06," London, 1908.

If it is difficult, as he shows, to settle by statistics the value of sanatoriums, it is even more difficult, by any such means, to decide between the advantages of change of climate and of care in a sanatorium at home. Indeed, upon such a statement of the problem there can be no decision. We must be sure we compare only factors which are comparable. To study the value of change of climate for a patient with pulmonary tuberculosis we must give our attention to that factor alone, and compare its influence only upon patients placed under similar conditions of nutrition and of medical supervision in the two places. If we are to judge of its relative advantage, we must compare only patients in sanatoriums in changed and in home climates, or patients in ordinary houses and a limited observation at home, with patients similarly situated, but with a change of climate.

As the purpose of this section, and especially of this symposium, is to consider the clinical, not the sociological, aspects of the question, I shall assume that the problem for solution is that of the individual patient. Indeed, it is always thus that it presents itself to us as physicians: "What is the best advice to give *this* patient?" "Shall we recommend him to stay at home under proper supervision or urge him to seek such supervision at once under changed conditions of climate?" The question therefore resolves itself into this: Will the patient obtain the essentials for his cure better at home, or by change of climate, and in what way may we expect a change of climate to influence these essentials?

Climate is the sum total of the meteorological conditions prevailing in a given region over a considerable period of time. It is the average condition of the meteorological phenomena characterizing that place. The weather is the immediate state of those phenomena at a given time. It is important to have this distinction clearly in mind. The weather may be very bad—cold and windy, for example, on a given day, in a place where the average and usual conditions forming the climate are those of warm and sunny days; and even the region of generally damp and cold climate may have its warm, dry days of beautiful weather. Climate is the sum total, the average state of the weather to be expected in a given region or place over a considerable period of time.

Every patient, therefore, wherever he dwells, lives in a climate of some kind. It is absurd to speak of the climatic treatment of tuberculosis as contrasted with the sanatorium treatment, for climate is not something which we may use or not in a given case, as we might a drug or serum. The climate has to be considered in every case; it cannot be avoided, for it is the average prevailing state of the weather—the temperature, the sunshine, the humidity, the precipitation, the wind, amid which the patient is living. Even if we decide to keep him at home, we thereby select a climate for him.

The problem, then, is whether these prevailing atmospheric conditions are such as best conduce to maintain or increase his powers of resistance to the tubercular invasion. The essentials to this end we have seen to be an outdoor life, food, and rest. The latter two of these depend for their full establishment upon the financial ability of the patient, and the judgment, skill, and dominance of his physician. So far as the question of nutrition is concerned, it is affected only indirectly by the meteroological conditions, according as these make greater or less demands upon tissue metabolism for heat production, and stimulate or diminish the appetite. It is the first of the three essentials, then, the outdoor life, which is most directly and to the greatest degree affected by the climate.

It being important for the cure of a patient suffering from a manifest or incipient tuberculosis that he lead a continouus outdoor life, it follows directly that there must be an advantage to such a patient in placing him as promptly as possible in a region where he can most constantly, most agreeably, and with the fewest difficulties, lead that life.

As the process of healing of a tubercular lesion is necessarily slow, and the establishment of a permanent recovery must take a period measured not by days but by months, during which time the patient should live out of doors, it is not the occasional pleasant day which counts, but the probability of such days prevailing over the long period necessary for the cure.

A patient can, of course, be kept out of doors in any weather, and pure air is the same everywhere; but in the actual management of a patient's life, it is not the merely possible, but the practically feasible, which concerns us most.

The character of the weather from day to day has a great influence upon the ease and safety with which an invalid can spend his time out of doors. It has perhaps even more influence upon the readiness with which he yields to that outdoor régime, enticing him in the one case, necessitating his being driven out in the other.

The temperature of the air, for instance, may in one place range so low as to necessitate so great an amount of clothing as to be a burden to the patient. In another place the temperature may be so high as to be oppress-

ive, diminishing the appetite and preventing such exercise as is desirable, or even any outdoor living during considerable portions of the day. A change from such a region to a cool, breezy climate needs no argument to prove its advantage in securing the desirable results of outdoor living.

The degree of actual and relative humidity affects the patient's sensation of the temperature, and his endurance of the heat or cold.

The advantage of sunlight and its effect upon the pleasure of the patient's outdoor life are also too obvious to need discussion. The duration of sunshine, the percentage of the total possible which is actually realized in any place, is a matter of no small importance to an invalid, especially if he is obliged to be inactive during the cold of winter days. In one region there may be out of a hundred consecutive days an average of only twenty which are clear, while in another, during the same period, there may be less than twenty which are cloudy.

It is not so easy for a patient to live out of doors, either at rest or in activity, even though the air he breathes be equally clear, in a place where fog and rain are frequent or semi-constant, as in one where week after week goes by without a cloud or drop of rain.

And so we might take up in turn each of the meteorological phenomena which are factors in the sum total of climate. I have said enough, however, to indicate the bearing which they must in general have upon the problem we are considering.

Not only the occurrence of days pleasant and suitable for easy outdoor living, without tax upon the patient's vitality, but the frequency, the continuousness of such days, the regularity of the diurnal variations, the probability and degree of sudden changes of these meteorological conditions, are matters of direct importance to the person who is expecting to lead a long-continued outdoor life. The physician who is mapping out such a life for a patient should know the climatic conditions under which he is living, and determine if it is possible to better them in any way. When we take a patient from a dark, unventilated closet in a tenement alley, and put him in a day-camp in the grounds of the municipal hospital in his own city, we change for the better the conditions of air, sunshine, and temperature under which he is living. We have improved those conditions for him perhaps relatively more than we do his rich fellow-citizen in sending the latter from his palatial home to a distant state. We have placed each, however, where his opportunity for outdoor life in fresh air and sunshine is better than it was before.

Every patient should be placed where the climatic conditions most favor his leading the proper outdoor life. If these conditions are found to a greater degree or in a more constant measure in another region than that in which he has been living, he should be advised to go to that place to live—to change

his climate. He moves into the better climate as one moves from a damp, ill-ventilated house to a sunny, well-drained one.

So far we have considered change of climate only as affecting the outdoor life. The outdoor life, however, is but one of the three essentials for the cure of a patient with pulmonary tuberculosis. The physician's oversight extends to the other two as well, and his duty, to securing the due and fullest measure of each. A change of climate should be urged, therefore, only when it can be made without a more than corresponding loss in the way of nutritious food and rest. There is no gain to a patient in placing him in the most ideal of climates if coincidentally he be sent to a place where he cannot secure proper food and the other conditions of right living. Any possible gain from the one factor is more than offset by the loss in the other two. It is manifestly bad therapeutic generalship to send a patient away from home, even to the best of climates, without the means to secure proper or necessary food, to say nothing of the hyperalimentation often desirable. A patient who at home might have abundance of food, and, though idle, continue to have it by reason of family assistance, may not, away from home, be able to command that aid in the form of money. To earn this by his own exertion demands work, often at a time when labor is impossible or most detrimental. Either the factor of food or rest suffers. Not only the amount of food, but its character, must be considered. A residence, for example, in a warm, dry climate loses much of its therapeutic value to a patient who may require a largely proteid diet, if it be in a region where ice is wanting and fresh meat difficult to secure or keep. The problem of nutrition, as we have seen, goes deeper than the mere question of food-supply. The change of climate may, by reason of altered conditions of temperature, sunshine, dryness, barometric pressure, prove beneficial to one patient, stimulating his nutritive activity in the way of appetite, digestion, and metabolism. It may be unavailing to another patient because of some factor unsuited to his condition, which so disturbs the physiological balance necessary to nutrition as to offset the other advantages of outdoor life.

The factor of rest must be considered in determining the relative advantage of change of climate. As in one case the problem of nutrition is more pressing than that of increased facility for outdoor life, so in another the question of rest may, for the time, be the dominant one. I have spoken of the disadvantage from a patient's trying to better his climate at the cost of having to work when unfitted for labor. On the other hand, a patient whose condition warrants labor, or whose social and financial circumstances are such that he is obliged to work, will find often that the gain from a better, milder climate will enable him to continue at his occupation as he could not under the old and less favorable conditions of prevailing weather. Such details are corollary to the question of change of climate. They do

not affect the principle involved, but are of great practical importance in the individual case.

Closely related to the question of nutrition and rest is that of proper, skilled medical supervision of the patient's life. The exceedingly elastic meaning which we must give to the term "rest" necessitates such competent medical control of the patient, wherever he may be. In determining, therefore, upon a change of climate, it is important to know whether in the new region of better outdoor facilities the patient can have the same degree of skilled advice as he could at home; and equally important to impress upon his mind the necessity for such control in the new abode. Patients too often act as if they had been taught that the change to a better climate constituted the whole cure. It only offers a better opportunity to work out that cure.

Finally, the mental and moral influences of a change of climate must be considered. The change of scene and surroundings often involved in securing a change of climate may have a most beneficial effect by stimulating interest in life—renewing hope of recovery, enthusing devotion to the necessary routine of the cure. If so, it strengthens the direct physical and physiological influences by the subtler but no less real psychical and moral forces. The separation from home and friends, which in one case may prove a beneficial rest from domestic cares and the ill-judged attentions of a solicitous family, may with another patient be so fraught with distress, worry, or homesickness as to be a bar to improvement. The sunniest skies smile not to the homesick. The removal of restraint from home surroundings may in still another case result in a license which proves disastrous to the patient's recovery.

I have purposely refrained from any discussion of the relative advantages of special types of climate, such as marine or mountain, and of the specific influence which the component factors of a climate may have upon the recovery from pulmonary tuberculosis. If by reason of experience or the acceptance of results of physiological experiment one believes that any of these factors are particularly and directly beneficial to the cure of pulmonary tuberculosis, then it is his duty to place his patient in a climate which, as far as possible, embodies that special character, while fulfilling the principal indications for outdoor life.

Conclusions.

An outdoor life is one of the essential aids to the cure of pulmonary tuberculosis.

The climatic surroundings of the patient have to be considered. Consciously or unconsciously, we select a climate for every patient, even when we keep him at home.

That climate is most favorable which most readily permits an outdoor life.

A change of climate will be of advantage to a patient if we can thereby place him under meteorological conditions which to a greater degree than before, and more constantly, permit him to lead the necessary outdoor life with ease, safety, and economy of vital expenditure.

The accompanying change of scene and surroundings may be expected to act advantageously in an indirect way.

In making any proposed change of climate attention must be given to the facilities in the new region for obtaining suitable food, accommodation, care, and medical supervision.

If these conditions can be fulfilled as well as at home, in a better climate, the patient should be advised to make the change.

If the patient's financial, social, or domestic circumstances are such that he cannot in the new climate secure proper and sufficient food, accommodation, care, and medical attention, or if his mental attitude is such as to make separation from home inadvisable, he should not be sent away.

Valeur comparative du changement de climat et du traitement dans un sanatorium à proximité, dans les cas de tuberculose pulmonaire.—(EDSON.)

Une vie en plein air est un des éléments les plus essentiels de la cure de la tuberculose pulmonaire. Le climat est l'ensemble des conditions météorologiques existant dans une région donnée pendant une période considérable de temps. L'entourage climatérique du malade doit être pris en considération. Nous choisissons un climat pour chaque malade, même quand nous le gardons à la maison. Que le climat le plus favorable est celui qui permet le plus facilement une vie en plein air. Un changement de climat sera un avantage pour le malade, seulement si, de ce fait, nous pouvons le placer dans des conditions météorologiques qui lui permettront, à un plus grand dégré et d'une manière plus constante que précédemment de mener la vie en plein air nécessaire, avec facilité, sûrete et économie de depense de force vitale. Il est à supposer que le changement d'air et d'entourage agisse avantageusement et d'une manière individuelle. En proposant un changement quelconque de climat, il faut s'enquérir avec soin si, dans la nouvelle région, on peut se procurer facilement une nourriture appropriée suffisante, un bon logement des soins et une surveillance médicale. Si ces conditions peuvent être remplies dans un climat meilleur aussi bein qu'à la maison, on doit conseiller au malade de faire le changement. Si, dans le nouveau climat, les circonstances financières, sociales, domestiques sont telles que le malade ne puisse se procurer une nourriture suffisante et convenable, un bon loge-

ment et des soins médicaux, ou si son attitude mentale est telle que la séparation d'avec la maison ne soit pas à conseiller, il ne faut pas lui faire le changement.

El Valor Comparado del Cambio de Clima y del Tratamiento en Sanatorios Cercanos en los Casos de Tuberculosis Pulmonar.—(EDSON.)

La vida al aire libre es uno de los complementos esenciales para la curación de la tuberculosis pulmonar. El clima es la resultante de las condiciones meteorológicas prevalecientas en una región dada en un período de tiempo considerable. Las condiciones del clima en que el enfermo vive deben tomarse en consideración. Nosotros escogemos un clima para cada paciente aun cuando le mantengamos en casa. El clima mas favorable es el que permite mas facilmente la vida al aire libre. El cambio de clima traerá ventajas el enfermo si por medio de élle colocamos en condiciones meteorologicas, que le permitan, en mayor grado que antes y con mas constancia, llevar la vida al aire libre que necesita, con facilidad, seguridad y economia de gasto vital.

El cambio incidental de escena y alrededores debe esperarse que actúe ventajosamente en el individuo. Al hacer un cambio de clima se debe tomar en consideración las facilidades que presenta la nueva localidad para obtener el alimento propio, alojamiento, cuidado y vigilancia médicas. Si estas condiciones queden obtenerse en un clima mejor con tanta facilidad como á domicilio se debe a consejar al paciente que haga el cambio.

Si las circumstancias monetarias, sociales ó domésticas del enfermo son tales que en el nuevo clima no puede conseguir al alimento apropiado y suficiente ó alojamiento, cuidado y atención médicas, ó si su condicion mental hace la separación de su hogar inconveniente, ésta no debe llevarse á cabo.

DIAGNOSIS AND TREATMENT OF EARLY CASES OF TUBERCULOSIS.

By Dr. Lawrence F. Flick,
Philadelphia.

Tuberculosis is probably always primarily a lymphatic process. As such it cannot be diagnosed except by reaction. Occasionally the lymphatic glands manifest the presence of the tubercle bacillus by enlargement. It is possible, however, that when this happens there is mixed infection, and that the enlargement occurs only when mixed infection exists.

Diagnosis of tuberculosis of the lymphatic tissue when there is little or no enlargement of the glands is impracticable. The condition is not a disease in the ordinary sense of that word, since it produces no discomfort and no interference with the ordinary pursuit of happiness.

Tuberculosis of the lymphatics may produce changes in physiological function and in the form of the body. These changes do not set up disease, however, in the ordinary sense of the term. Underweight relative to height, hypertrophy of the lymphatic tissue in the mucous membranes, bad muscular development, and various nervous symptoms, may be due to it, but the relationship between it and the condition is not recognized.

Immunity no doubt frequently develops in these mild forms of tuberculosis, and recovery takes place without the process having been discovered. These are the recoveries which leave earmarks found at autopsy upon death from other causes and help to swell the number of implantations of tuberculosis recorded.

The form of tuberculosis which most concerns the physician is lung tuberculosis. The lungs are most frequently the seat of the tuberculous process next to the lymphatic system, and usually the first in which invasion of parenchymatous tissue occurs. This is because the lungs are most exposed to implantation when tubercle bacilli pass from the lymph into the blood. The lymph which goes into the blood all passes through the lungs before it goes into any other part of the body, and the lungs are apt to strain out any bacilli which may exist in it.

The apices of the lungs along their posterior pleural border probably are the primary seat of lung tuberculosis. Probably both sides are implanted

at the same time, but usually one side only has a successful growth for the time being. As a rule, this is the right side. The first growth is usually very small and does not give rise to symptoms which attract attention. This is the real incipient stage of lung tuberculosis, the stage in which it would be most profitable to find the disease. Unfortunately, it is not often found in this stage.

The discovery of tuberculosis in this stage is possible, but difficult. The chief obstacle in the way is the general ignorance upon this subject. The people at large have an idea that tuberculosis cannot exist without violent cough, sweats, and emaciation, and the medical profession unfortunately still looks upon everything short of a fatal condition of the lungs as a mere cold. With the mind preoccupied with erroneous ideas both by the laity and by the profession, tuberculosis of the lungs is not looked for until health is seriously undermined.

For the diagnosis of tuberculosis when the process is still limited to the outer border of the lung and the infiltration area is small, the mind must be alert and follow every clue which arouses suspicion. If a person is in ill health at all, if he deviates from the normal in weight, in color, in strength, or in his physiological functions, tuberculosis should be looked for. If a history of fruitful exposure to the disease exists, even though the general health is good, it should be looked for. In this connection one should bear in mind that early tuberculosis of the lungs may produce symptoms and may not produce them. If symptoms exist, those symptoms should be followed out until a logical explanation of them has been found. If a history of tuberculosis exists and there are no symptoms, a searching investigation should be made until the existence of the disease can be definitely excluded. In this regard nothing should be taken for granted.

The subjective symptoms in these cases may be an occasional cough, hypersecretion of mucus in the respiratory tract, loss of appetite, a feeling of malaise, especially in the forenoon, flushes, sometimes headache in the afternoon, and occasionally a hypersensitiveness of the entire nervous system. There may be alternating vivacity and depression. As objective symptoms one may find, if the temperature is taken at short intervals during the day, a slight rise of temperature above the normal, possibly reaching 99° and sometimes 100°; a pulse above the normal; and pupils dilated, perhaps one, perhaps both. On physical examination one may find slight bronchovesicular breathing over the affected area—perhaps merely harsh breathing with a slight pleuritic rub on expiration; some increase in tactile fremitus and vocal resonance, as a rule, but not always; slight bronchophony; and usually impairment of resonance. The impaired note may be merely a deviation fron the normal, but it is distinctly circumscribed. Physical signs are more apt to be found over the back than the front, but may

also be found above the clavicle and over the clavicle. With a circumscribed lesion of this character and subjective and objective symptoms corroborating the story told by the lesion, the diagnosis of tuberculosis is justifiable, however improbable it may look otherwise.

Tuberculosis of the lungs of a more advanced character than that just described may still be termed early tuberculosis from the viewpoint both of time and of prognosis. Infiltration of a whole lobe with some softening and even with slight cavitation, and infiltration of one lobe with scattered tubercles in another lobe or even in two other lobes, may be considered early tuberculosis of the lungs from the diagnostic point of view. As a matter of time tuberculosis of years' duration may be called early when the disease is very chronic, because in such cases the natural duration of the disease is many years; as a matter of prognosis tuberculosis is early so long as recovery can take place without much loss of tissue. It is in this sense that we must speak of early diagnosis of tuberculosis, because it is in this sense only that we can get cases to diagnose. Tuberculosis really does not become a disease until considerable tissue has been invaded, often not until some tissue has been destroyed, and the physician cannot expect to be consulted until it has become a disease.

The only way in which lymphatic tuberculosis and lung tuberculosis in their very beginning are likely to be found is by looking for them in well people who have been exposed to tuberculosis intimately enough and long enough to make an implantation possible. The probabilities are that all people who have been exposed in this way have tuberculosis in the lymphatic stage or in the very early lung stage. Search for these kind of cases may be made in dispensaries, and occasionally in private practice, but cannot be pursued extensively in private practice in the present state of public enlightenment, inasmuch as to do so would expose the physician to criticism.

Diagnosis of lung tuberculosis when a whole lobe is involved is easy enough, and failure to make such a diagnosis at the present day lays the physician open to just criticism. The history of the case and the subjective symptoms ought by themselves to enable the physician to make a tentative diagnosis. With a history of exposure to tuberculosis, with malaise, gastric disturbance, pain, some sense of shortness of breath, a sense of physical incapacity, cough, expectoration, chilliness, or a sense of heat and loss of appetite, or at least of relish of food, with any or all of these symptoms and with absence of normal physical signs over a part of the lungs, unless the symptoms and the condition can be definitely explained in another way, the diagnosis of lung tuberculosis is always justifiable. Absence of tubercle bacilli from the sputum in such conditions must not be allowed to weigh too heavily against such a diagnosis.

To the trained expert a physical diagnosis of these cases is easy and can be

made positively. When there is mere infiltration and the tubercles are small and scattered, the vesicular breathing over the part leans very strongly toward the bronchial type, but still is vesicular in character. There is prolongation of the respiratory murmur and usually a slight pleuritic rub, showing itself by a slight expiratory whiff with the last half of the expiratory movement. There is a slight increase in tactile fremitus, slight increase in vocal resonance, and there may be feeble bronchophony. On percussion there is well-defined impairment of resonance, but not dullness. The most distinctive feature of these physical signs is their localization. When infiltration is dense and there is secondary infection, with perhaps some pneumonic process, or the tubercles have become very large and have softened, there are bronchial breathing, increased tactile fremitus, marked increased vocal resonance, marked prolongation of the expiratory murmur, and dullness on percussion. The dullness may end abruptly or shade off to normal resonance along the border-lines between the diseased and healthy lung.

When the process has gone a little further and some of the nodules have softened and been emptied, much of the congestion has disappeared from the lung, and the breathing may again have become largely vesicular, but usually is somewhat feeble. Tactile fremitus may have become normal again, vocal resonance may have become normal, and bronchophony likely has been replaced by whispering pectoriloquy. On percussion a tympanitic quality is found in the note, and if the excavation is at all large, localized tympany can be elicited. When the small cavity has dried up completely and the process has taken on a condition of rest, the physical signs in these cases come so near to the normal that the condition is often overlooked. These are the cases in which the general practitioner most frequently fails to make a diagnosis. When an individual with such a condition, however, takes a cold, the physical signs take on a character which approaches nearer to the physical signs found in more acute conditions, and this makes the diagnosis easier. Absence of the normal physical signs or deficiency of the normal physical signs should always raise the question of tuberculosis in the mind of the examiner, and if he cannot clear up the case himself, he should send it to some one who has been specially trained for work of this kind.

The treatment of early tuberculosis is simple and fairly accurate. There undoubtedly is a greater tendency to recovery than to destruction. Treatment is a retracing of the steps which led to development.

It is worth while, however, in discussing the treatment of tuberculosis to define at the outset what is meant by recovery. As there is no disease, in the ordinary sense of the term, before considerable damage has been done, so recovery does not necessarily imply sterility from the tubercle bacillus. It is questionable whether a person who has had an implantation of tuberculosis ordinarily ever gets free from tubercle bacilli. Recovery, therefore,

means arrest of the process of destruction and restoration to physiological health, but nothing more. For practical purposes this recovery is just as good as any one can wish for. The only drawback to it is that it only lasts so long as the mode of life which brought it about is adhered to. It may be that in recovery before destruction of tissue has taken place the host becomes absolutely free from bacilli, but of this we are not certain. We have reason to believe that the individual who has made such a recovery earns thereby a fair immunity against subsequent attacks. Our clinical observations on human beings in this regard have been corroborated in a sense by Calmette's and von Behring's experiments on animals.

For recovery from uncomplicated and unmixed lymphatic tuberculosis and the first stage of lung tuberculosis all that is necessary, as a rule, is a simple life, properly selected diet, fresh air, and such medication as is necessary to restore the human organism to its physiological functions. Where these things have not been departed from and an implantation has taken place by reason of intense exposure to contagion, recovery usually is brought about by nature without intervention and without discovery of the process. People develop tuberculosis when it has been implanted through overwork, dissipation, improper feeding, too much indoor life in badly ventilated rooms, and depression from some great disaster, grief, or acute disease other than tuberculosis. It is even quite possible that an implantation will not take place in a perfectly healthy normal human being.

For recovery from tuberculosis when the disease has gone beyond the lymphatics and has invaded considerable lung tissue, with possibly some destruction of tissue, and with perhaps even a slight mixed infection, somewhat more heroic measures are necessary. In this stage the human organism has already suffered some in its physiological capacity of fighting disease and making nutrition. There is already a deficit in the bank account. The treatment must seek to reëstablish the credit of human economy. With this object in view consumption of energy must be curtailed and the manufacture of energy must be encouraged.

The treatment of this kind of cases is really the practical problem of the physician, because these are the early cases which are likely to consult him and in which he can produce good results. Most of these cases can be restored to a condition of physical health and a complete arrest of the disease.

In proportion as the disease is advanced in the stage of destruction of tissue it becomes necessary to put the patient to rest to economize expenditure of energy. As most patients come to the doctor with a mild attack of mixed infection from cold, a pneumococcic infection, or influenza, it is a good practice to send every patient to bed for a week or two as the beginning of the treatment. Complete rest in bed for these cases usually has a marvelous influence for good. The heart is relieved of its excessive burden

and the circulation in the lungs at once improves, with abeyance of cough and all the acute symptoms which have brought the patient to the doctor. This rest in bed also facilitates the recovery of lost energy as manifested by lost weight. The patient usually gains considerable weight during this rest. After a few weeks of absolute rest in bed the patient may advantageously be put upon comparative rest; that is, sitting up for the greater part of the day and resting in bed during the middle of the day and during long hours overnight. Later still he may be put on light exercise, to be gradually increased to the point of endurance of a fair day's manual work.

In the latter part of treatment work or exercise is of just as much importance as is absolute rest, and a fact which should not be lost sight of by the physician who is looking for good results in the treatment of his cases.

For the manufacture of new energy a carefully selected diet is of much importance. This diet should be varied somewhat to suit the individual, but a good general basis for it is a liberal supply of milk and eggs with a reduction in the amount of solid food. My own formula for years has been one meal of solid food a day and three quarts of milk and six raw eggs to make up for the other two meals. My one meal I direct to be of the most liberal character: beefsteak, roast beef, roast mutton, mutton chops, fresh vegetables, fresh fruit, and an hour to eat it in. The time for this meal should always be specified by the physician, and instruction should be given the patient to masticate his food well and to take all the pleasure possible out of eating it. A large meal eaten with relish will give a better return than many small meals taken with disrelish. The amount of time, moreover, required for digesting a large meal is practically the same as the amount of time required for digesting a small meal. By limiting the solid food to one meal a day the burden thrown upon the stomach is lessened.

Three quarts of milk and six raw eggs a day amply make up for the two meals which have been cut out and supply a form of easily digested food which gives a large return in energy for the burden which is thrown upon the economy. The large amount of liquid in this diet probably is a benefit also in that it helps to keep the kidneys well washed out, and by leaving a very small amount of residue of undigested food lightens the burden of the intestines. I usually advise my patients to eat fruit and nuts between times if the one meal and three quarts of milk and six raw eggs do not satisfy them, but I prohibit them the use of any other form of solid food until they have regained a normal weight.

Oxygen is just as necessary as food for proper nutrition, and it is therefore of primary importance for the manufacture of nutrition to supply the requisite amount of oxygen. Patients should be kept in the open air night and day, and if they cannot be kept out of doors comfortably, should be kept indoors with indoors so well ventilated as to make it practically the

same as out of doors. The living-room and the sleeping-room of the patient, if he sleeps in the house, must constantly have all the windows open, and cross-ventilation is absolutely necessary for a proper air-supply. Drafts can be entirely disregarded, except in so far as this is necessary to make the patient comfortable. A patient may well sit between two open windows if he is properly clothed.

Fresh air is necessary for another reason besides furnishing the proper amount of oxygen for the oxidization of food. Re-breathed air is a poison, and the individual who is struggling against tuberculosis is already overburdened with toxin and should not have any of his own making reintroduced into him. The atmosphere has the power of cleansing itself in the open, but not when it is restrained within an inclosure. When we exhale in the open air, that which we throw out goes beyond our reach, and the air which we take in, even though it may have some impurities of various kinds, is at least free from the impurities and poisons given off by our own bodies. The tuberculous subject, therefore, should always breathe air which has not been breathed before, and should be so placed night and day as to be able to do this.

As to medication, I personally believe that much can be done to aid recovery from tuberculosis by the use of properly selected drugs. In a general way drugs should be used to restore physiological functions of the body when those have been deranged. If the functions of the stomach are incomplete, they should be supplemented by artificial digestion. When the eliminatory organs are not doing their workings properly, they should be corrected and aided. When the heart is overactive, it should be quieted down. No drugs, however, should be given which dry up the secretions and excretions, and which interfere with the natural process of recovery instituted by nature itself. Opiates and depressants of all kinds should be avoided. Symptoms should never be treated under any circumstances, but should always be looked upon as an indication of nature's effort to restore the individual to a normal condition. Cough can usually be controlled by will-power as much as it needs to be controlled. If the secretions are not free enough and the cough is thereby made excessive, these should be stimulated and not repressed. A good general rule to lay down in medication is to give no drug except for a specific reason in harmony with nature's laws and not in contradiction of them. Where a drug can help elimination, help secretion, or help to bring back an organ to its normal function, it may be used advantageously; but no drug should ever be used to quiet the cry of an organ for relief because that relief is not forthcoming, and to shut off the very action which the organ is crying for.

There are no specifics in tuberculosis, but there is at least one drug which is of very great value on general principles as an adjuvant, namely, iodin.

Iodin has been used in many ways in the treatment of tuberculosis from time immemorial, and in whatever form it has been used it has been found useful. I have personally for many years used it by inunction in the form of one of the rich compounds which break down readily. I first used iodoform, and more recently europhen, as less offensive to the patient. I give inunctions with a saturated solution of europhen in olive oil twice a day, and I use a similar solution as an inunction for the lymphatic tissue of the pharynx. I am convinced that I have obtained more benefit from the use of this drug in this way than from any other medication I have used. Nutrition improves rapidly under these inunctions, and the local signs of the disease disappear. How the iodin acts I am not prepared to say, but of the results I have not the slightest doubt.

Some of the other drugs which I use quite frequently are nitroglycerin, sulphate of magnesia, strychnin, arsenic, pepsin, pancreatin, hydrochloric acid, phosphoric acid, and sometimes digitalis. These drugs I use when they are indicated to reëstablish a physiological function which has been weakened.

Tuberculosis in the early stage can be treated successfully at home in any climate. In cases in which there is no broken-down tissue treatment in the home of the patient is preferable to any other. The treatment brings with it the necessary training for after-life. When a patient has recovered away from home, either in a sanatorium or in change of climate, he often has much difficulty in settling down to the kind of home life necessary for maintaining the health which he has recovered.

All cases cannot be treated at home, however. For various reasons some patients cannot be brought under discipline at home. The fault may be in their own physical or mental make-up or it may be in the environment. Such cases should be treated in a sanatorium in the climate to which they have been accustomed. It is better to do this than to change climate, since it eliminates the element of reacclimatization from the after-life of the patient.

After sanatorium treatment has restored the individual to physical health home treatment should be instituted to equip him for practical life. Under no circumstances should he be thrown on his own resources until he has been trained to live properly in his old sphere of usefulness or in any new sphere that he may take up.

Diagnose et Traitement de la Tuberculose à son Début.—(Flick.)

La tuberculose est, à l'origine, un processus lymphatique. On peut donc la diagnostiquer par réaction et par dilatation. Ce n'est pas une maladie

au sens ordinaire de ce mot. Elle peut causer une réduction de poids, une hypertrophie des tissus lymphatiques, des membranes muqueuses, un mauvais développement musculaire, et des troubles nerveux, mais la parenté n'est pas reconnue. L'immunité peut suivre la tuberculose lymphatique. La tuberculose pulmonaire offre le plus grand intérêt au médecin. C'est seulement quand la tuberculose produit la maladie qu'elle attire l'attention. La tuberculose pulmonaire est la plus fréquente après la tuberculose lymphatique parce que les bacilles tuberculeux qui passent des vaisseaux lymphatiques dans les vaisseaux sanguins traversent les poumons avant de se répandre dans le reste du corps. Les sommets des poumons sont d'abord affectés le long de leur bord supérieur. La maladie se développe plus souvent du côté droit que du côté gauche. Le diagnostic de la tuberculose pulmonaire à son premier degré, avant qu'il n'y ait eu destruction des tissus, est difficile. Le processus n'est pas assez désastreux pour attirer l'attention. On devrait chercher à le constater chez toute personne qui a été exposée à une contagion sérieuse. Les symptômes subjectifs de la tuberculose pulmonaire à son début peuvent être: la toux, l'hypersécrétion des muqueuses, la perte de l'appétit, le malaise, et la surexcitation du système nerveux. Les symptômes objectifs peuvent être: une élévation de température, l'irrégularité du pouls et la dilatation des pupilles. Les signes physiques peuvent être; une légère respiration broncho-vésiculaire sur la surface affectée, un frottement pleurétique à l'expiration, une augmentation du frémissement tactile et de la résonnance vocale, une légère bronchophonie et une difficulté de résonnance. Il faut chercher les signes physiques d'abord sur le dos et sur une surface limitée. La tuberculose est encore à son début, pour le temps et pour le pronostic, tant qu'elle reste limitée à un seul lobe d'un seul poumon, ou même à deux lobes, pourvu qu'il n'y ait pas une grande destruction de tissu. Les symptômes dans cette période plus avancée sont d'ordinaire: le malaise, des troubles gastriques, une respiration plus courte, un sentiment d'incapacité physique, la toux, l'expectoration, des frissons ou une sensation de chaleur et la perte d'appétit. Les signes physiques sont: un souffle bronchique, le prolongement du murmure expiratoire, le frottement pleurétique, l'augmentation du frémissement tactile et de la résonnance vocale, une faible bronchophonie et une difficulté de résonnance. Quand l'infiltration est considérable, quand il y a infection secondaire, les symptômes sont plus marqués et la percussion donne un son mat. Quand le processus est arrivé à la formation d'une caverne et que la caverne est petite, le frémissement tactile et la résonnance vocale sont révenus à l'état normal et la bronchophonie est remplacée par une pectoriloquie murmurante. La percussion donne un son tympanique. A mesure qu'une caverne sèche, les signes physiques redeviennent presque normaux, sauf en ce qui concerne la quantité. L'absence ou l'insuffisance de signes physiques normaux doivent faire poser la question de tuberculose.

L'absence de bacilles tuberculeux dans les crachats ne doit pas peser d'un trop grand poids contre le diagnostic.

Pour traiter la tuberculose à son début, il faut rebrousser le chemin suivi par la maladie. Il suffit pour cela d'une vie simple, d'une diète appropriée, du grande air et de la médication nécessaire pour rétablir l'organisme humain dans ses fonctions physiologiques. La guérison de la tuberculose a un sens restreint. Le mot signifie un arrêt dans le processus de destruction et le rétablissement de la santé physiologique: il n'implique pas une condition de stérilité par rapport aux bacilles tuberculeux. Il n'est pas certain que la guérison signifie jamais déliverance complète du bacille tuberculeux. Celle-ci peut se produire dans la tuberculose lymphatique et dans la tuberculose pulmonaire avant la destruction des tissus. La guérison dans ces cas donne parfois l'immunité, apparemment. Quand la tuberculose est plus avancée et qu'il s'est déjà produit un deficit dans la capacité physiologique de l'organisme, il faut recourir à un traitement plus héroïque. On mettra le malade au lit pour un repos absolu pendant quelque temps, on lui fera prendre ensuite un repos relatif d'une plus grande durée, puis on lui prescrira un exercise qui augmentera graduellement. L'exercice est aussi important dans la dernière période du traitement que le repos dans la première. La diète sera soigneusement appropriée aux besoins de l'individu. Généralement parlant, une bonne diète se compose d'un repas solide par jour, plus trois litres de lait et six œufs crus par jour. Le repas se composera de bifteck, de bœuf rôti ou de mouton rôti, avec des légumes frais et des fruits frais. Le malade devra mettre une heure à absorber ce repas. Entre temps, il pourra manger des fruits et des noix. L'oxygène est tout aussi essentiel à une nutrition convenable que les aliments: il est donc de toute importance que le malade vivre à grand air pendant chacune des 24 heures du jour. Il ne devra jamais respirer un air vicié. S'il ne peut vivre au grand air, il devra du moins habiter une chambre aérée transversalement. Les courants d'air ne peuvent lui faire aucun mal s'il est convénablement vêtu. La médication peut produire d'excellents résultats. L'iode est le meilleur remède que je connaisse: je l'emploie sous forme pommade d'europhen. On appliquera les remèdes pour stimuler l'action physiologique, jamais pour l'entraver. On cherche à favoriser l'élimination des poisons et des micro-organismes. On stimulera la nutrition. La tuberculose à son premier degré peut etre traitée avec succès au domicile du malade sous tous les climats. Le traitement à domicile prépare le malade à la vie qu'il mènera ensuite. S'il est impossible d'organiser ce traitement à domicile, on enverra le malade dans un sanatorium sous le climat auquel il aura été habitué. Quand le traitement au sanatorium aura rétabli sa santé physique, on lui fera suivre un traitement à domicile pour lui enseigner comment il devra vivre pour se maintenir en bon état.

Diagnóstico y Tratamiento de los Casos prematuros de Tuberculosis.— (FLICK.)

El curso de la tuberculosis es primitivamente de naturaleza linfática. Como tal puede hacerse el diagnóstico por reacción y agrandamiento. No es una enfermedad en él sentido commun de la palabra. Puede producir disminucion de peso, hipertrofia de los tejido linfáticos de las mucosas, desarrollo muscular pobre y síntomas nerviosos, pero las relaciónes no son reconocidas. Immunidad puede ser el resultado de la tuberculosis. La tuberculosis pulmonar es del mayor interés para el medico. La tuberculosis llama la atención solo cuando produce enfermedad. La forma mas frecuente de tuberculosis despues de la del sistema linfático es la pulmonar, por que los bacilos de la tuberculosis que pasan de á corriente linfática á la sangre atraviezan los pulmones antes de desparramarse en el resto del cuerpo. Las partes primitivamente afectadas son los vértices á lo largo del borde posterior pleural. Mas á menudo el desarrollo se verifica en el lado derecho que en el izquierdo. El diagnóstico de la tuberculosis en el período primitivo de los tejidos es dificil. El proceso no ha producido suficiente enfermedad para llamar la atención. Debe investigarse en todas las personas que han estado expuestas al contagio efectivo. Los síntomas subjetivos de la tuberculosis pulmonar incipiente pueden ser: tos, secreción excesiva de mucusodidades, péridida del apetito, malestar general y sensibilidad exagerada del sistema nervioso. Los sintomas objetivos pueden ser: elevación de la temperatura, desarreglo de la frecuencia del pulso y dilatación de la pupila. Los síntomas físicos pueden ser: respiración bronquiovesicular leve al nivel de las áreas afectadas, ruido de frote pleurítico durante la expiración, aumento de la vibración torácica y de la resonancia vocal. Los signos deben buscarse primero en las espaldas en un área circunscrita. La tuberculosis está todavía en estado incipiente con relación, al tiempo y al pronóstico cuando está limitada a un lóbulo del pulmón, ó dos, con tal que no la acompañe, mucha destrucción de tejido. Los síntomas en este estado mas avanzado son generalmente: malestar, desarreglos del estómago, un poco de cortedad en la respiración, sensación de incapacidad fisica, tos, expectoración, frialdad ó sensación de calor y pérdida del apetito. Los signos físicos son: respiración bronquial, prolongación del murmullo expiratorio, frote pleurítico, aumento de la resonancia vocal y de la vibración torácica, broncofonia ligera y disminución de la sonoridad. Cuando la infiltración es densa ó hay infección secundaria todos los síntomas son mas marcádas y la matités aparece. Cuando el proceso tuberculoso ha avanzado lo suficiente para producir cavidades y estas son pequeñas, la vibración torácica y la sonoridad vocal aparecen de nuevo en su estado normal y la broncofonía es remplazada por pectoriloquia afónica. La nota producida

por la percusión es timpánica. Cuando una cavidad de pequeñas dimensiones se seca los síntomas físicos se vuelven normales casi, excepto en cantidad. La ausencia ó deficiencia de los signos físicos normales debe traer á la mente la posibilidad la infección tuberculosa. La ausencia del bacilo en el esputo no debe influenciar demasiado el valor de un diagnóstico positivo.

El tratamiento de la tuberculosis incipiente es un repaso del camino que ha seguido el desarrallo de la enfermedad. Lo único necesario es la vida simple, dieta apropriada y escogida, aire puro y la administración de las drogas necesarias para restaurar el organismo á su funcionamiento fisiológico. La curación de la tuberculosis tiene un significado muy restricto; quiere decir: detenimiento del proceso destructivo y restauración á la salud fisiológica mas no implica esterilidad del bacilo de la enfermedad. Es dudoso que la curación signifique ausencia del bacilo. Esto puede verificarse en la tuberculosis linfática ó pulmonar antes de la destrucción de los tejidos. En estas condiciones el restablecimiento produce algunas veces, aparentement, la inmunidad. Cuando la tuberculosis ha avanzado mas y ya hay un déficit en la capacidad fisiológica del organismo se necesita un tratamiento mas heroico. El paciente debe permanecer en cama, en descanso completo, por algún tiempo, después en descanso relativo y por último debe ordenarse el aumento gradual de ejercicio. El ejercicio es tan importante en el tratamiento, mas tarde, como el descanso absoluto fué al principio. La dieta debe escogerse cuidadosamente según las conveniencias individuales. Como base general para la dieta puede ordenarse una buena comida de alimentos sólidos, tres cuartas de leche y seis huevos crudos al dia. La comida debe consistir de beefsteak, asado de vaca ó carnero, legumbres y frutas frescas. Debe instruirse al paciente para que emplee una hora en consumir esta comida. Se puede permitir frutas y nueces en los intervalos entre las comidas.

El oxígeno es un alimento tan importante como cualquier otro y por lo tanto es muy necesario que el enfermo respire aire puro durante las veintecuatro horas del día. En ningún caso deberá respirar aire viciado. Si no puede vivir fuera de casa deberá ocupar un cuarto ventilado abiertamente. Las corrientes de aire no le hacen daño si está vestido apropiadamente. Las medicinas pueden hacerle mucho beneficio. El iodo es la mejor droga que conozco y yo la uso en unciones en la forma de "europhen." Las drogas deben usarse para estimular las acciónes fisiológicas y nunca para estorbarlas. Se debe facilitar la eliminación de productos tóxicos y microbios. Se debe estimular la nutrición. En sus comienzos la tuberculosis puede tratarse con éxito en casa, en cualquier clima. El tratamiento á domicilio es una preparación para la vida del paciente en lo futuro. Cuando no se pueda establecer la disciplina apropiada en casa, el enfermo debe trasladarse á un sanatorio en el mismo clima en que está acostumbrado á vivir. Después que el tratamiento en el sanatorio ha á restaurado la salud fisiológica al en-

fermo, éste debe tratarse en su hogar ensenandale el modo de vivir y mantenerse bien.

Diagnose und Behandlung frühzeitiger Fälle von Tuberkulose.—(FLICK.)

Tuberkulose ist ursprünglich ein lymphatischer Prozess. Als solcher kann sie durch Reaktion und Vergrösserung diagnostiziert werden. Sie ist keine Krankheit im gewöhnlichen Sinne des Wortes. Sie mag Untergewicht, Hypertrophie der lymphatischen Gewebe, der Schleimhäute, schlechte Muskelentwicklung und Nervensymptome hervorrufen, aber die Beziehungen sind nicht bekannt. Der lymphatischen Tuberkulose mag Immunität folgen. Lungentuberkulose ist für den Arzt von höchstem Interesse. Tuberkulose zieht die Aufmerksamkeit nur wenn sie eine Erkrankung hervorruft, auf sich. Lungentuberkulose ist nächst der lymphatischen am häufigsten, da die Bazillen, die vom Lymph- in den Blutstrom passieren, zuerst durch die Lunge und dann durch den übrigen Körper gehen. Die Lungenspitzen sind längs des vorderen Pleuralrandes zuerst affiziert. Die Entwicklung vollzieht sich öfter an der rechten als an der linken Seite. Die Diagnose der Lungentuberkulose im ersten Stadium, bevor eine Gewebszerstörung eintritt, ist schwierig. Das Fieber ruft keine genügende Erkrankung hervor, um die Aufmerksamkeit zu erregen. Man sollte danach bei allen Personen suchen, die einem fruchtbaren Kontagium ausgesetzt waren. Die subjektiven Symptome bei einer frühen Tuberkulose können Husten, Hypersekretion von Schleim, Appetitverlust, Malaise, und Überempfindlichkeit des Nervensystems sein. Die objektiven Symptome können Temperatursteigerung, Störung der Pulsrate, und erweiterte Pupillen sein. Die physikalischen Zeichen können sein: leichtes broncho-vesiculäres Athmen über der affizierten Partie, Steigerung des taktilen Fremitus und der Stimmresonanz, leichte Bronchophonie und Ungleichheit der Resonanz. Nach den physikalischen Zeichen sollte zuerst über dem Rücken über einer umschriebenen Partie gesucht werden. Tuberkulose ist noch früh, sowohl in Bezug auf Zeit als auf Prognose, wenn sie auf einen Lappen einer Lunge beschränkt ist oder sogar auf zwei Lappen, vorausgesetzt, dass nicht viel Gewebszerstörung vorhanden ist. Die Symptome in diesem mehr vorgeschrittenen Stadium sind: Malaise, Magenverstimmungen, ein Gefühl von kurzem Athem, ein Gefühl von körperlicher Leistungsunfähigkeit, Husten, Auswurf, Frösteln oder Hitzegefühl, und Appetitmangel. Die physikalischen Zeichen sind: Bronchialathmen, Verlängerung des Ausathmungsgeräusches, pleuritische Reibung, Vermehrung des Taktilfremitus und der Stimmresonanz, leichte Bronchophonie, und Ungleichheit der Resonanz. Wenn eine dichte Infiltration oder eine sekundäre Infektion vorhanden ist, sind die Symptome markierter und Perkussion ergiebt eine Dämpfung. Wenn der Prozess in Kavernenbildung übergegangen ist, sind Taktilfremitus

und Stimmresonanz wieder normal geworden und die Bronchophonie ist durch flüsternde Pektoriloquie ersetzt worden. Die Perkussionserscheinung ist tympanitisch geworden. Wenn eine kleine Kaverne austrocknet, werden die physikalischen Zeichen wieder normal, ausgenommen in Bezug auf Quantität. Abwesenheit oder ungenügendes Vorhandensein der physikalischen Zeichen sollte die Frage nach Tuberkulose aufkommen lassen. Abwesenheit von Tuberkelbazillen im Sputum sollte gegen die Diagnose nicht zu schwer ins Gewicht fallen.

Die Behandlung der frühzeitigen Tuberkulose ist ein Zurückgehen zu den Schritten, die zur Entwicklung der Krankheit führen. Alles was nötig ist, ist ein einfaches Leben, sorgfältig gewählte Diät, frische Luft, und eine Medikation, die nötig ist, den menschlichen Organismus zu seinen physiologischen Funktionen zurückzubringen; Genesung von Tuberkulose hat eine eingeschränkte Bedeutung. Sie bedeutet einen Stillstand des Zerstörungsprozesses und eine Wiederherstellung der physiologischen Gesundheit, aber keinen Zustand von Immunität dem Tuberkelbazillus gegenüber. Dies mag in lymphatischer und Lungentuberkulose vorkommen, bevor eine Gewebszerstörung stattgefunden hat. Genesung von solchen Zuständen verursacht manchmal anscheinend Immunität. Wenn die Tuberkulose mehr vorgeschritten ist und bereits ein Defekt in der physiologischen Widerstandskraft des Organismus vorhanden ist, dann mag eine heroischere Behandlung nötig sein. Der Patient sollte zu vollkommener Ruhe für eine Zeit lang zu Bette gebracht werden, zu verhältnismässiger Ruhe für eine darauffolgende Zeit und dann zu nach und nach ansteigender körperlicher Übung angehalten werden. Die Körperübungen sind für den späteren Teil der Behandlung ebenso wichtig, wie die Ruhe für den ersten Teil derselben. Die Diät sollte sorgfältig ausgewählt sein, um dem Individuum zu entsprechen. Eine gute allgemeine Grundlage für die Diät ist ein feste Mahlzeit, drei Quarts Milch, und sechs rohe Eier täglich. Die eine Mahlzeit sollte aus Beefsteak, gebratenem Rind- oder Hammelfleisch mit frischen Gemüsen und aus Obst bestehen. Der Patient sollte angewiesen werden, eine Stunde lang an dieser Mahlzeit zu essen. In der Zwischenzeit sollten Früchte und Nüsse gegessen werden. Sauerstoff ist für eine ordentliche Ernährung ebenso wichtig, als das Essen und es ist daher notwendig, dass der Patient für die ganzen vierundzwanzig Stunden frische Luft habe. Er sollte unter gar keinen Umständen bereits geathmete Luft einathmen. Wenn er nicht im Freien leben kann, so sollte er in einem Zimmer mit Kreuzventilation leben. Zugluft kann ihm keinen Schaden tun, wenn er genügend bekleidet ist. Viel kann durch die Medikation hinzugetan werden. Jod ist die mir bekannte beste Arznei, und ich wende es in der Form von Europhen als Einreibung an. Drogen sollten dazu verwendet werden, die physiologische Tätigkeit anzuregen, nicht aber um dagegen zu arbeiten.

Die Eliminierung von Giften und Mikroorganismen sollte angestrebt werden. Die Ernährung sollte angeregt werden. Tuberkulose im Anfangsstadium kann zu Hause in irgend einem Klima mit Erfolg behandelt werden. Die Heimbehandlung bereitet den Patienten für sein späteres Leben vor.

Wenn man zu Hause keine richtige Disziplin erreichen kann, sollte der Patient in einem Sanatorium in einem Klima, ähnlich dem, in welchem er zu leben pflegte, behandelt werden. Wenn die Sanatorium-Behandlung dem Individuum seine physische Gesundheit wiedergegeben hat, sollte ihm ein Kurs in der Nachbehandlung gegeben werden, um ihn zu lehren, wie er zu leben hat um sich wohl zu erhalten.

X-RAY EXAMINATIONS IN PULMONARY TUBERCULOSIS.

A protecting fluoroscope, crayon-holder, photograph of tube-holder, three negatives of same patient showing the different results obtained by different exposures, three prints from the same negative showing that a negative is more dependable than a print, photograph of pivoted chair showing how the chest may be easily examined at any desired angle in a horizontal plane, a densitometer, fluoroscopic tracings, etc., were shown.

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I shall consider this subject under three heads:

1. Methods of making X-ray examinations with entire safety to both patient and physician.

2. The value of X-ray examinations compared with that of auscultation and percussion.

3. The service rendered by X-ray examinations in pulmonary tuberculosis and associated conditions.

1. (A) *Precautions.*—The X-rays must not be allowed to reach the patient except in the special place desired, and not permitted to reach the physician at all, as otherwise he may be exposed daily for months or years. Such serious consequences have fallen upon practitioners, on account of lack of care, that too much stress cannot be laid upon this point. To accomplish the necessary protection for both patient and physician the X-ray tube should be enclosed in a box, with a suitable opening, coated on the inside with some material that obstructs the passage of the rays except in the desired direction, as suggested by Dr. William Rollins. When a radiograph is to be taken, the physician should be further protected by a sheet of lead $\frac{1}{4}$ inch or more thick placed between him and the tube to act as a barrier when he turns on the current, or the switch may be placed in another room. The safeguards for making a fluoroscopic examination are not so simple, although only about $\frac{1}{100}$ as much X-light is used for this purpose, measured by the fluorometer, as is generally employed for taking a radiograph. But the physician should be protected even from this. In addition to the tube-holder, the fluoroscope should be provided with a metal sheet to protect the hand and face, and also with a plate of lead glass 1 inch thick, which offers no impediment to the view of the fluorescent screen, to protect the eyes of the practitioner. Further, in order that his hand may not enter the path of the X-rays, the crayon, with which he draws the outlines of the appearances seen, should have a long handle. These safeguards illustrate sufficiently what I mean by protection.

(B) *Radiographs.*—When taking radiographs of or making a fluoroscopic examination of the chest, the X-ray tube should be placed at a distance of 30 inches (75 cm.), and, as a rule, in the same relation to the patient,—a convenient place is opposite the median line on a level with the fourth rib,—so that radiographs made at different times by the same or other physicians may be readily compared. It is desirable that the profession should agree upon certain standard positions of the tube with relation to the patient, both for taking radiographs and for making fluoroscopic examinations of the chest as a whole, and of special regions. Radiographs should usually be taken in deep inspiration, as at this time differences in density can be best recorded on the plate, and the amount of X-light used be sufficient to take a picture in a few seconds, or for special purposes in a fraction of a second, as is done by Rieder, of Munich, and others.

Much experience is needed not to overexpose the plate. It must be remembered that a negative of the soft parts is desired and not of the bones, and that negatives attractive photographically may be comparatively valueless medically. Prints are not so satisfactory, as a rule, as the negatives themselves, therefore the negatives should be examined when possible and under suitable illumination from different points of view, in one of which the eye should be placed in the same position the anode held in relation to the plate when the radiograph was taken.

The interpretation of negatives made from life should be based on a large experience and supplemented by a study of negatives taken of bodies soon after death, and this study followed by a comparison of the appearances seen on these negatives with those seen in the lungs at the autopsy.

(C) *Fluoroscopic Examinations.*—Before beginning the fluoroscopic examination, which should be made in a darkened room, the physician should test his eyes with a spinthariscope to ascertain that they are in a suitable condition for his work. The patient may be examined lying on a stretcher or seated in a pivoted chair.* A small amount of light should be used—only about $\frac{1}{100}$ the amount of X-light frequently employed for taking a radiograph. The light must be perfectly steady and so arranged that the physician can as easily increase or diminish it during the progress of the examination as he can turn a gaslight up or down. These are indispensable conditions, and without them the best fluoroscopic examination cannot be made. Few practitioners realize the importance of using a small amount of perfectly steady light. In examining the chest for early tuberculosis the light should be so low that the healthy side is only faintly illuminated, as thus a slight increase in density in the lung under examination, which would not otherwise be recognized, is made evident by contrast. Hyaline

*"The X-rays in Medicine," System of Medicine (Allbutt and Rolleston), second edition, 1905, i, 491.

casts, as is well known, cannot be seen in the microscope if there is too much light. The appearances seen in the chest may be drawn on the skin in outline and transferred to tracing paper, or drawn directly on the tracing paper, and these tracings should be kept for reference in connection with the notes of the ordinary physical examination. A second examination should be made in early tuberculosis after an interval of about two weeks, to confirm or refute the appearances first seen, and also to assist the practitioner to differentiate between the causes of the appearances present, as, for example, between a recent lobar pneumonia at the apex, which is improving, and a beginning tuberculosis.

The orthodiagraph may be used when examining the chest with the fluoroscope, but the method I have described, of placing the X-ray tube at a sufficient distance to avoid exaggeration of the shadow, is simpler and accurate enough for most purposes. If the object to be examined is very large, an enlarged heart, for example, the tube may be placed first opposite one border, and then the other. It is difficult for the physician to protect himself completely from the action of the rays if he uses an orthodiagraph.

2. *The Value of X-ray Examinations Compared with that of Auscultation and Percussion.*—In cases of pulmonary tuberculosis or in suspicious cases the practitioner is called upon to determine, for example, the excursion of the diaphragm, the size or displacement of the heart, the density of the lungs, the presence of enlarged tracheal glands and calcified deposits. In order to illustrate the value of X-ray examinations of the chest in these conditions, let me compare the amount and accuracy of the information obtained by this method with that derived from the older methods.

(A) *The Excursion of the Diaphragm.*—The excursion of the diaphragm can be watched and accurately measured by means of the fluoroscope. The results obtained by Litten's sign or by percussion, when checked by this X-ray examination, are shown to give inaccurate information in a large percentage of cases.

(B) *The Position and Size of the Heart.*—The accurate determination of the position and size of the heart by means of percussion has been shown by X-ray examinations to be very difficult, if not sometimes impossible. After more than twelve years' experience with X-ray examinations in a large hospital, which has given me an opportunity to compare the outlines obtained by means of the fluoroscope with those determined by percussion, I have not as yet found any physician whose results from percussion were always accurate. These outlines were made by house physicians who were in daily training in making physical examinations of the chest, by members of the Visiting and Out-Patient Staff, and by a considerable number of physicians who visited the hospital to see the work carried on in the X-ray department. The X-rays have an unquestionable advantage over other methods for

determining the position of the heart and showing the displacement that occurs in pulmonary tuberculosis.

A heart that is smaller than normal, which may be present in early tuberculosis, is often not recognized by the physician if the ordinary methods are used. In a series of 1000 autopsies I found such hearts had been overlooked to a surprising degree. This would not have happened if an X-ray examination had been made.

(C) *The Density of the Lungs.*—The increase in density of the lungs has hitherto been determined chiefly by the sense of sound, that is, by percussion and auscultation. These older methods may indicate the abnormal density that occurs near the surface, but not what obtains in the central portion of the lungs. Familiar examples of this fact are seen in patients with central pneumonia. Here the diagnosis is not difficult from the clinical history, etc., but the ordinary physical signs are wanting in the early stage. By the newer method, an examination by the X-rays, the sense of sight is used, and this reveals changes in the central portion of the lungs beyond the reach of the ear. I have always been able to find the increase in density in central pneumonia by means of the X-rays. Moreover, the density of the lungs can be determined quantitatively as well as qualitatively and changes in it noted by means of the X-rays. For example, the difference in the density of the lungs in inspiration and expiration can be detected by a fluoroscopic examination if a small amount of steady X-light, the intensity of which can be easily controlled, is used, and this density can be measured in terms of water by a densitometer* used in connection with the fluoroscope. The different degrees of density in health and disease can also thus be measured. For example, the density of the chest in tuberculosis may correspond to 10, 15, or more centimeters of water; the density of the chest in a healthy adult in deep inspiration, to about 6 cm.

* "It (densitometer) consists, as you see, of a glass tube ten inches long and open at the top, with a piece of rib placed across the middle of the opening. The bottom is made of a piece of cork which is equal in density to ⅛ inch of water. On one side of the tube near the base is a small opening to which a rubber tubing is fastened and through which water can flow in or out of the main tube from a reservoir and thus lower or raise the height of water in the tube. There is a scale on the outer side of this tube. To use this instrument, the X-ray tube is placed below the patient, who is lying on a stretcher, and the X-light adjusted until a rib is just visible. The densitometer is then put beside the patient and the water is allowed to flow into it until the piece of rib across the top of the densitometer tube is also just visible. The depth of water in the tube, which is shown by the scale, represents, after allowance is made for the chest-walls, the thickness of which varies in different individuals, the density in terms of water of the part of the thorax examined, not with scientific accuracy, but with an accuracy sufficient to be helpful clinically. A similar measurement of each side of the thorax enables the physician to compare their respective densities. A better way of measuring the density is to take the piece of rib used in the densitometer and place it on a standard thickness of metal, first over the patient's thorax and afterward in the densitometer, and compare the two measurements thus made." (Taken from a paper read by Dr. Williams at the meeting of the American Climatological Association, June, 1908.)

of water; and the difference in density between inspiration and expiration in health to 1 to 2 cm. of water.

To illustrate further the slight increase in density that may be recognized by means of the X-rays, let me pass this negative of the chest of a man taken two hours after death caused by peritonitis. At the autopsy, made in the pathological department at the Boston City Hospital, no raised areas were found in the lungs on cut section, nor areas palpable to the finger on the cut surface. The microscopical examination showed that in the discrete dark-red areas seen, which varied grossly from one to two centimeters in diameter to those barely visible, the alveoli and capillaries were distended with red blood-corpuscles. The slide under the microscope shows one of the sections made. These areas, although not offering sufficient density to be recognized by the careful palpation of the pathologist, are to be seen in the negative in contrast with the surrounding healthy lung tissue, showing that a comparatively slight thickness of blood replacing the air in the lungs will give differentiation on the plate. If such small areas of congestion can be recognized by means of the X-rays, it would seem still less difficult to recognize a congested or even denser apex by comparison with a normal one, which is usually to be found in early tuberculosis.

(D) *Glands.*—An X-ray examination has a preëminent value in the recognition of enlarged bronchial glands, especially in infants and children. In very young patients this information may serve as an early warning and point out the cause of an obscure rise in temperature. Leroux, of Paris, has published this year an article on tuberculosis in young patients which is based on a study of 500 cases examined by means of the X-rays and other methods. He considers that there are two ways in which chronic pulmonary tuberculosis begins in infancy:

First, with the bronchial glands, and afterward extends to the lung.

Second, at the apex of one lung, and is accompanied by involvement of the glands.

Leroux found that tuberculosis in the glands alone occurred more frequently in the youngest children—those between one and five years of age. In infants the glands were often diseased on one side only; more often on the right than on the left side.

Calcified Deposits.—The radiograph may give evidence of the presence of a calcified deposit no larger than a pea; in fact, a deposit only 2 mm. in diameter that was in an intercostal space and near the surface of the lung, on the side next the plate, has been thus recognized and its presence confirmed at autopsy. Such small areas of calcification are beyond the reach of the ordinary methods of examination.

In a word, X-ray examinations give more accurate outlines of the organs in the chest and of their movements, and more accurate infor-

mation regarding the density of the thoracic contents, than auscultation and percussion.

In some cases the X-rays indicate the presence of cavities. A. Stanley Green has said that when a cavity is suspected, he takes a radiograph, then allows the patient to cough and expectorate, and then makes a second radiograph. In the first the opacity seen is homogeneous; in the second the cavity appears as a light area.

Comparison of Value of Radiograph and Fluoroscope.—The radiograph is a record in itself of the appearances in the chest, and it shows better than the fluoroscope glandular enlargements and small areas of calcification of the lungs that cause a slight shadow only. Sometimes the increase in the density of the lungs is more apparent in a radiograph, and sometimes by means of the fluoroscope, but, as a rule, I believe it can be more readily detected by the fluoroscope, and, further, it can be measured by this instrument in connection with the densitometer.

The fluoroscope also has the advantage of enabling the practitioner to watch the lungs, heart, and diaphragm in motion, and to examine the patient easily from more than one point of view, including the oblique examination, as suggested by Béclére for interlobar pleurisy. For purposes of record the appearances thus seen can be outlined directly on the skin and afterward transferred to tracing paper, or drawn directly on the tracing paper, as already mentioned. The fluoroscope gives more information of the condition of the chest than the radiograph, but both are often needed.

X-ray Examinations Made by the Same Physician Who Makes the Ordinary Physical Examination.—The examination of a print from a negative taken by some other than the examining physician is hardly to be considered an X-ray examination of the chest. Nor is it a good way for the fluoroscopic examination to be made by one practitioner and the auscultation and percussion done by another. The best X-ray examination is made by the physician who supervises the making of and interprets the negatives, observes the conditions in the chest by means of the fluoroscope, and also does the auscultation, percussion, palpation, and inspection, and obtains the history, etc. When all these methods are carried out by the same person—a competent physician—and the findings compared and considered, then, and then only, can the best results of an X-ray examination be obtained.

It is often found, for example, that the cause of dullness which cannot well be explained after percussion alone, becomes clear when auscultation has been made. In the same way an X-ray examination supplements percussion and auscultation. The three methods are of assistance independently, but of special value when the results are considered together, the eye aiding the hand and ear. In doubtful or obscure thoracic diseases the physical examination of the thorax is not complete without an X-ray examination

made by means of both the radiograph and the fluoroscope. Eventually all physicians who make a specialty of diseases of the thorax will, I believe, use the X-rays just as an oculist now uses an ophthalmoscope for examinations of the eye.

3. *The Services Rendered by X-ray Examinations in Pulmonary Tuberculosis and Associated Conditions.*—X-ray examinations aid in making an *early* diagnosis of pulmonary tuberculosis, sometimes indicating that the lungs are abnormal before the ordinary physical examination, and thus help to prevent the spread of the disease and to increase the percentage of recoveries. By early tuberculosis I mean a case in which tuberculosis might be suspected, but in which the patient has no cough and doubtful or even no physical signs. Precautionary X-ray examinations are useful for examining persons who have a family history of, or have been exposed to, tuberculosis. They would likewise be of assistance as a preventive to the co-workers of a tuberculous patient and as a protection to the community if systematically employed. In the line of preventive medicine, hospitals and dispensaries would do well to arrange for hours convenient for working people when careful and complete examination of the thorax could be made. X-ray examinations are also of service in cases in which one lung is affected, for if the other is watched by this method, disease may be recognized in the second lung earlier than by the ordinary physical examination. They also give more information regarding the extent of the disease, and this knowledge may be of the utmost importance in prognosis and treatment; they assist the physician to determine whether the patient is improving or growing worse, they aid him to recognize fibroid and miliary tuberculosis, to detect an old tuberculosis by means of the calcification observed, and to note enlarged glands and cavities.

Conditions Associated with Pulmonary Tuberculosis.—X-ray examinations aid the physician in determining the presence of pleurisy with effusion, pericardial effusion, emphysema, and pneumothorax with or without fluid. Let me give one or two illustrations of their value in this direction. The presence of tuberculosis may be marked by emphysema if the patient is examined by auscultation and percussion, but if examined by the X-rays under this condition, the presence of tuberculosis is the more evident. An X-ray examination shows clearly the presence of pneumothorax, a condition which is, I believe, not infrequently overlooked by the ordinary physical examination. My reason for this belief is the fact that during the past twelve years examinations with the fluoroscope have in so many instances first shown its presence. The recognition of this condition may be of vital importance to the patient. One of my patients with pneumothorax and tuberculosis suddenly became unconscious and pulseless while I was in the ward, but was immediately relieved by thoracentecis.

Cases Simulating Tuberculosis.—X-rays are also of value in cases simulating tuberculosis, and should cause the physician to hesitate to make this diagnosis, although the ordinary physical examination suggests it. In a decision so vital to the patient as to whether or not he has pulmonary tuberculosis every harmless means of diagnosis should be employed.

X-ray examinations, while not infallible, add to our knowledge of the conditions present in the chest, and give corroborative, more accurate, and sometimes earlier information than the older methods.

Examen por los Rayos X en la Tuberculosis Pulmonar.—(WILLIAMS.)

El tema este artículo será considerado bajo tres distintos encabezamientos:

1. Métodos usados para hacer exámenes por medio de las rayos x con entera seguridad tanto para el paciente como para el médico.

2. Comparación entre los resultados obtenidos por medio de algunos de los viejos métodos usados para determinar la excurción diafragmática, la posición y tamaño del corazón, la densidad de los pulmones, el reconocimiento de las glándulas traqueales, etc., etc., y los resultados obtenidos con el uso de los rayos x.

3. Indicaciones respecto á la manera como los exámenes con los rayos x pueden ser de alguna utilidad en la tuberculosis pulmonar; por ejemplo:

Como auxiliar para hacer un diagnóstico temprano. Para determinar la extensión de la enfermedad. En las formas miliar aguda y fibrosa. En los casos complicados con enfisema pulmonar, pleuresía con derrame, pneumotorax, etc., etc. Para el reconocimiento de las glándulas traqueales, cavidades pulmonares, etc. En casos de tuberculosis simulada. Exámenes de precaución con los rayos x hechos de cuando en cuando en pacientes que han estado expuestos a la enfermedad; v. g.: miembros de la misma familia.

Examens aux Rayons-X dans la Tuberculose pulmonaire.—(WILLIAMS.)

Le sujet de la communication sera considéré sur trois côtés:

1. Des méthodes employées pour faire les examens avec les rayons-x avec une entière sécurité pour le malade et pour le médecin.

2. Une comparaison entre les résultats obtenus par quelques-unes des plus anciennes méthodes en usage pour déterminer l'excursion du diaphragme, la position et la grandeur du cœur, la densité des poumons, la découverte des glandes trachéennes, etc., et ceux obtenus par les examens des rayons-x.

3. Une indication des services que peuvent rendre, dans la tuberculose, les examens faits avec les rayons-x, comme par exemple:

Pour établir un diagnostic précoce.

Pour déterminer l'étendue de la maladie.

Dans la tuberculose miliare et fibroïde aiguë.

Dans la tuberculose associée à l'emphysème, à la pleurésie avec effusion, au pneumothorax, etc.

Pour reconnaître les glandes trachéennes, les cavités dans les poumons, etc.

Dans les cas simulant la tuberculose.

Examens de précaution, faits de temps en temps dans les malades qui out été exposés à la maladie comme, par exemple, les membres d'une même famille.

Röntgenstrahlen-Untersuchungen in der Lungen-Tuberkulose.— (Williams.)

Der Gegenstand dieses Aufsatzes wird in drei Rubriken geteilt:

1. Methoden, die in Untersuchungen mit Röntgenstrahlen mit gänzlicher Sicherheit für den Patienten sowohl als auch für den Arzt angewendet werden können.

2. Eine Vergleichung der Resultate, erlangt mit gewissen älteren Methoden, die noch jezt angewendet werden, um die Bewegungen des Zwerchfells, die Lage und Grösse des Herzens, die Dichtigkeit der Lungen, die Anwesenheit von Trachealdrüsen u. s. w. zu bestimmen mit den Ergebnissen der Röntgenstrahlen-Untersuchungen.

3. Anweisung wie die Untersuchungen mit Röntgenstrahlen in der Lungentuberkulose von Wert sein können, z. B.: als Hilfsmittel bei der Frühdiagnose. Zur Bestimmung der Ausdehnung der Krankheit. In der akuten, miliären und in der fibrösen Tuberkulose. In Tuberkulose begleitet von Emphysem, Rippenfellentzündung mit Erguss, Pneumothorax, etc. Zur Erkennung von Trachealdrüsen, Höhlen in der Lunge, etc. In Fällen, welche Tuberkulose vortäuschen. Prophylaktische Röntgenstrahlen-Untersuchungen, von Zeit zu Zeit ausgeführt an Personen, die der Krankheit ausgesetzt waren, wie z. B. Mitglieder derselben Familie.

ROENTGENOGRAPHY IN THE DIAGNOSIS OF EARLY TUBERCULOSIS OF THE LUNGS.

By Henry Hulst, A.M., M.D.,
Grand Rapids, Michigan.

The earliest stage of tuberculosis of the lungs, the entrance of the bacillus, goes unnoticed. This applies even to the tuberculin test in its varied forms, which occupies a place by itself, but tells us nothing of the location and gravity of this disease, as well as to the methods of physical diagnosis. Moreover, until the bacilli appear in the sputa their presence in the lung is a matter of inference only. We do not hear the bacilli with the stethoscope. The ear hears catarrh. The thermometer registers temperature. The Roentgenographic plate or screen "sees" density differences. "Inspection" has now been enlarged so as to include photography and fluoroscopy by means of the Roentgen rays.

The value of such an examination is determined by what it makes visible, and this depends upon:

1. The make-up of the object.
2. The quantity and quality of the rays.
3. The ray transformer (the eye is blind to the Roentgen ray as such), whether fluorescing screen or photographic plate or film.

The constitution of the object, the specific gravity and thickness of the tissues to be pictured, are fixed factors. Not so the rays. For not only does a tube of a given vacuum emit rays of various penetrating power, but their quality and quantity also depend upon the vacuum of the tube, which changes more or less during even a short exposure. Rays that go through all the tissues equally well (if there be such) leave no shadows; such as are completely absorbed, nothing but shadows. By themselves both are diagnostically useless. There must be wide differences, therefore, between what is possibly revealed on screen or plate according to the balancing of these factors. But there are others. The sensitiveness of the eye to the screen image as well as the quality of the ray-transformers vary. The progress made is not due to improvement in these accessories. Screens, I think, are not made as well, on the whole, as formerly, and the specific Roentgen-ray plate remains a possibility merely. But there *is* a growing ability to make, to select, and to use the exact quality and quantity of rays best suited to the requirements of each examination.

For what now seems like a long time we had been able to distinguish extreme differences of density only. Yet to bring out ever finer detail, to distinguish, is the business of the Roentgenogist. *He teaches well who distinguishes well,* applies to his task with peculiar force.

The early period of contrasts is passing over into the present and future one of detail in contrast. Now, contrast is to detail in a Roentgen-ray likeness what emphasis is to fullness of meaning in rhetoric. Emphasis, contrast, precede fullness of meaning and detail in the evolution of both. I realized this particularly the other day when I had occasion to review my entire series of lung plates. Those of the early days showed enough of contrast, but scarcely any detail. In the mistaken effort to cause the ribs, vertebræ, and heart to stand out boldly, brilliant pictures were produced, made up of clear whites and jet blacks, while almost every bit of lung detail was rayed into utter darkness. Only so-called von Criegern accompanying heart shadows, very ancient consolidations, and calcified glands had any chance of getting on, or rather, of remaining on, the plate.

These Roentgenographs resembled screen images in their lack of detail and were the result of too long exposures with feeble rays. No wonder that photographic method remained neglected until the increasing demand for detail in fractures, and especially in bone diseases, led to the development of a Roentgenographic technic which resolves the undifferentiated shadows into genuine structure pictures. For the study of the phenomena of motion the fluoroscope remains indispensable. But unless observers take altogether better care to protect themselves than appears from Holzknecht's recent illustrated description of his own technic, I am afraid that some such enthusiasts may soon have occasion to damn the fluoroscope, as I once heard it damned at a convention of experts, as an invention of the devil.

"Thus far I have been able to detect an abnormal condition of the lungs in early tuberculosis better by means of the fluoroscope screen than by means of the photograph," writes Dr. Williams; not entirely because by means of it he can better watch the movements of the diaphragm, whose limited excursion goes by the name of Williams' sign, for he adds: "When instantaneous photographs can be carried out in the lungs, a better opportunity will be offered for obtaining evidence of beginning tuberculosis by photograph than has hitherto been given." This, again, with a view not to the diaphragm, of course, but to lung detail. And this was published in 1901, at the time when Europe was making such photographs and had been for two years. The first one-second and less pictures made in this country were shown by me at the meeting of the American Roentgen Ray Society at Chicago in 1902.

I dwell upon this not as any reason for ignoring Williams' sign, though the fact is recognized that the sign is not always present and is not necessarily

due to tuberculosis when found. Arnospenger observed it in only 6 per cent. of his carefully studied cases. Pforringer and Bunz regard the sign as not valuable. In cases showing no involvement beyond a slight enlargement of the intrathoracic glands De la Camp did not find the sign at all, though he did when the pleura were involved, and in so-called early cases depending upon an exacerbation of an ancient process. As a preliminary to a Roentgenographic examination the fluoroscopic constation of Williams' sign, though it does not constitute a crucial test, may serve as valuable corroborative evidence, and it is as such that I appreciate it. But as an easy substitute for Roentgenography it must be regarded as entirely inadequate and reactionary.

What does a Roentgenograph teach? Clearly this depends upon the changes present in the lung, the quality of the picture, and the skill with which it is read. The plate refuses to record changes before they exist. Therefore the earliest *hint* of tuberculosis is not always obtainable by this method. Its claim to recognition is based not solely nor chiefly on the earliness, but on the positiveness and completeness with which it permits the early diagnosis to be made. The sounds obtainable by ordinary physical diagnosis have not the significance of the spots and localized increase of lung detail clearly visible even at a distance on a plate properly made. Strings of minute, bead-like structures, often no larger than a pinhead; isolated bronchial and pulmonary glands, soft as well as hard; groups of glands; areas of consolidation and of thickened pleura; effusions and cavities, both deep and quite small, such as frequently cannot be detected in any other way, are shown with wonderful distinctness on the plate. And though we may not be able to translate all the hieroglyphic wealth of detail, enough is understood to get at its general meaning, so as not to overlook the forest for the trees, and to stimulate to further effort at interpretation.

Percussion also is not learned in a day. Before closing this summary discussion with the demonstration of a few plates, a word more is needed on how to make them.

Long exposures, while the patient breathes, with soft—that is, feebly penetrating—rays, constituted the method of the period of screening contrasts without detail of soft tissues. Soft rays, but extremely short exposure (instead of three or four minutes, one second or less), the patient holding his breath in full inspiration, are needed to obtain lung detail. The ordinary lunger is an easy subject, and can be done in about one-quarter of a second without the use of intensifying screens, which are not desirable in this work unless the focus of the tube be at least ten feet away.

This takes energy; but the prevailing impression that monstrous machinery is required to do this difficult work is entirely unfounded. At present, it is true, I prefer for certain technical reasons my static machine,

by far the most powerful one ever built; but my first quarter of a second picture was taken with an old-fashioned hammer-break 18-inch Queen coil, run on a home-made Wehnelt interrupter. Any good 16-inch coil, if properly interrupted and adjusted, and some coils of only 9-inch spark length, suffice to cut down the exposure to one second, so that there can be no excuse for any one to spoil the picture by allowing the patient to breathe. The use of the diaphragm is based on correct principles and offers certain advantages for obtaining unblurred pictures of selected small areas; but when the inventor of the compression diaphragm makes use of it for one-minute exposures of the apices, he violates other principles equally if not more important, and loses more than he gains.

If the diaphragm picture cannot be made with a one-second exposure, the technic is at fault more often than the apparatus.

The expert needs good tools, but above all an adequate technic based on correct principles, and the experienced skill of the trained physician to interpret the results.

FLUOROSCOPY AS A ROUTINE METHOD OF CLINICAL INVESTIGATION OF TUBERCULOSIS OF THE LUNG.

By Dr. Edouard Rist,
Paris

It is now twelve years since one has begun to use X-rays for exploring the thoracic organs. During that short space of time the instrumental methods have received considerable improvement; we have to-day at our disposal quite a number of apparatus, the handling of which is perfectly simple and easy, and which enables the average medical man to make a precise and useful examination, after a training which should certainly not be longer or more difficult than such as is required for using the ophthalmoscope.

However, it cannot be denied that, in the opinion of the majority, Roentgen stethoscopy is still regarded as a method which should be applied only in exceptional cases. It is not yet on an equal standing with the stethacoustic methods for which we are indebted to Laënnec and Skoda. There may be many reasons for that, and it is not my object to enter into an analysis and discussion of them in the present paper; but I wish to suggest that, foremost among them, is, probably, the fact that the greater number of medical men have only witnessed in exceptional circumstances a radiographical examination of the chest. As a rule, when they think such an examination might be of some use in a given case, they send their patient to an X-ray expert, and get their information by proxy; whereas they all have a personal, daily renewed, and enlarged experience of the excellence of clinical methods like auscultation and percussion. It is altogether necessary, in order to appreciate the practical value and efficiency of Roentgen stethoscopy in diagnosis, to consider it as a routine every-day clinical method, which should be applied to all cases alongside the older methods. In this way, only, will it be possible to obtain what additional help fluoroscopy brings to the forming of a correct diagnosis.

Fluoroscopy and skiagraphy supply us with information concerning the form, the size, and the situation of the thoracic organs. They show us, also, to what degree certain parts of the normally transparent lung have lost their permeability to Roentgen rays, from which we may infer that the said parts have become less permeated by the atmospheric air. Further,

radioscopical methods enable us to observe, study, and even measure the movements of muscular organs like heart or diaphragm. The information supplied by Roentgen methods is accordingly of the same kind as that we are accustomed to derive from the older stethacoustic methods; it concerns chiefly the modifications which have occurred in the physical condition of the thoracic organs. If, on the other hand, Roentgen stethoscopy always gave us exactly the same information as auscultation and percussion, it would be of little avail to us. In order to establish its usefulness as a clinical method of diagnosis one must prove that it can supply us with good and reliable information in many circumstances when auscultation and percussion leave us in the dark. X-ray examination has been compared to percussion, and there is no doubt that the dark patches on the screen or on the skiagraph are generally the dull or flat patches for the finger and the ear. But one must not forget that only the peripheral areas of the lung are apt to be explored by percussion, when Roentgen rays penetrate through the whole lung and will discover a dark patch even in the deeply situated parts of the viscus. This shows that radiological examination will be particularly useful in informing us about the topographical distribution and the real extension of lesions, the nature of which has to be investigated by other methods.

I take it for granted that, for the ordinary routine examination of the chest, fluoroscopy will be used rather than skiagraphy. There is no doubt that the first named of the two processes enables us to look through a patient's chest in every possible direction. With the modern instruments, it is an easy thing to modify instantaneously and at will the position of the tube as well as the position and attitude of the patient, and to obtain in some seconds an almost unlimited number of different views, at the same time studying the movements of the chest, diaphragm, and heart; whereas skiagraphy only furnishes us with a small number of pictures and does not show us the organs in motion. Beclerc very justly compares fluoroscopy with microscopical examination, whereas skiagraphy can be put together with microphotography, which is specially useful for demonstration rather than for diagnosis.

I wish now to consider some of the circumstances where Roentgen stethoscopy can help us in asserting or in denying a diagnosis of tuberculosis of the lungs, or where it adds to our clinical diagnosis some valuable and useful information.

Every chest specialist knows that the error of mistaking for confirmed phthisis some other disease is by no means exceptional, and that fluoroscopy enables us to correct such mistakes by pointing clearly to the real cause of an obscure condition, such as interlobar or encysted empyema, echinococcus, or tumor of the lung. It may be, also, that in a case of long-

persistent, chronic bronchial catarrh, with fever and wasting, suggesting the idea of common phthisis, the fluoroscopy will show the lung perfectly clear, especially in the apical regions, thus obliging the physician to abandon the diagnosis of tuberculosis and to look for some chronic rhinopharyngeal condition simulating phthisis, as is pretty often the case. However, I do not want to lay much stress on the above-described circumstances, which speak almost too obviously in favor of my argument.

Let us rather consider the case where there can be no doubt of the existence of lung tuberculosis, and where Koch's bacillus has been found in the sputum. Everybody knows that post-mortem examinations of phthisical cases generally show more wide-spread and more destructive lesions than clinical symptoms have led us to suspect, and this fact very clearly illustrates the difficulty and even impossibility of exploring adequately deeper regions of the lung by means of stethacoustic methods. Now, fluoroscopy very often shows that lesions are much more extensive than one would suppose, and, accordingly, explains the discrepancy between serious general symptoms and minimal local signs which is often so puzzling and so distressing to the practitioner. It enables him to discover the existence of cavities when the clinical signs of such are absent. It reveals that, more frequently than is generally supposed, both apices are dark, whereas clinical investigation pointed to a single-sided alteration. As a matter of fact, when we examine the apices by the stethacoustic methods, we are obliged to judge from comparison between both sides, and we are very naturally apt to regard as sound the apex where respiratory abnormalities are only less marked.

It has often occurred to me that, finding in a patient a very limited area of high-pitched percussion-tone under the collar bone, with diminution of the respiratory measure, I diagnosed a narrow area of incipient tuberculous congestion: but, examining the patient with the fluoroscope, I was surprised to find that the darkening of the apex extended over half or more of the superior lobe. This led me to look for Koch's bacilli, and to find them in abundant numbers in cases where one should hardly have expected to detect them.

The physician's opinion as to the form and topography of lesions in a given case of tuberculosis may, therefore, vary very much according to whether he has or has not used the fluoroscope. But it must not be forgotten that the darkening of an apex does not necessarily point to active consolidation; it may as well be a lasting remnant of some old process which ended by fibrous transformation of the lung tissue. It occurs frequently that, in a case which, on clinical grounds, should be considered as an incipient one, the fluoroscope shows a rather extensive and more or less marked darkening of an apex, and compels us to look far back into the past history of the patient to discover the beginnings of a local bacillar infection appar-

ently quite recent. In such circumstances there is also a discrepancy between the extensive abnormal darkness in the apex and the mild local symptoms; if the sputum is free from bacilli, or if the functional and general symptoms are also of a mild character, the evidence will be in favor of an old lesion with tendency to fibrous transformation. The dark patch may then almost be considered as pointing to a scar. It is very common to observe in these circumstances the existence of other characteristic signs of a sclerotic condition of the lungs, such as limited areas of exaggerated transparence indicating local emphysema, or very dark spots pointing to calcified foci or enlargement of the shadows of the peribronchial lymph-nodes.

It is a well-known fact that intense and extended congestive symptoms of short duration, with tubular murmur and percussion dullness or flatness, may be very misleading and simulate the severe condition which has received the name of caseous pneumonia. The fluoroscope will help us to avoid this error, by showing that the lung tissue has not lost its permeability to the degree which stethacoustic methods would lead us to suppose. The shadow, though extended, is only slight, and disappears almost entirely when the patient is asked to make a deep inspiration.

Pleural effusion, which is such a common occurrence in lung tuberculosis, is best diagnosed by exploratory tapping of the chest. Fluoroscopic investigation is useful in order to ascertain the amount of fluid present, but does not give us, on the whole, better information than percussion. But later on, when the fluid has been evacuated or absorbed, Roentgen stethoscopy is of the highest value in enabling us to determine to what extent the pleura remains thickened, or whether there are pleural adhesions or not; we can observe how, in inspiration, the transparent lung does not, as it normally should, penetrate down into the angular space between the diaphragm and the costal wall; we can notice, also, the diminution of the normal inspiratory expansion of the diaphragm.

As to interlobar and diaphragmatic effusions,—more frequent in the course of chronic tuberculosis than is generally supposed,—it may be said that fluoroscopy is often the only means of discovering their existence. They do not, as a rule, cause the very striking and painful subjective and functional symptoms which are so valuable in diagnosing them when they are complicating simple croupous pneumonia. But they are commonly latent and insidious, bearing the mark of intercostal or phrenic neuralgia. The same remark applies also to pneumothorax, a condition which the fluoroscope reveals most admirably, even when all the classical symptoms are wanting.

So far, we have considered some of the circumstances where Roentgen stethoscopy enables us to make a diagnosis of tuberculosis more complete and more accurate. We must now give our attention to another kind of

case; viz., those of latent tuberculosis. They generally belong to fibrous phthisis.

It has been shown already what the radiological characteristic symptoms of fibrous tuberculosis are. The clinical manifestations of this disease are very protean, and it is often very difficult to trace back the real cause of some of them. If the fluoroscope shows dark apices with enlarged tracheal lymph-nodes in the chest of a case of asthma, one may pretty safely infer that fibrous tuberculosis is the real determinant of the asthmatic condition. Emphysema is often, also, a consequence of fibrous tuberculosis. Furthermore, cardiac symptoms connected with dilatation of the heart without any valvular defect will sometimes be attributable to a sclerotic condition of the lungs caused by fibrous tuberculosis.

I will finally consider with what kind of information fluoroscopy can provide us in the early diagnosis of incipient tuberculosis of the lungs. It is a very delicate question, and the short time at my disposal will not enable me to go into details. I have shown already that Roentgen stethoscopy often compels us to regard as an old and chronic condition what otherwise would be looked at as incipient tuberculosis. This is particularly the case in adults, and it is a fact which only confirms the more and more generally accepted opinion that tuberculosis is commonly acquired in childhood, and that its early stages are very rarely seen in grown-up people. I have examined a large number of children, in order to ascertain if, in the early period of tuberculous infection, the fluoroscope might reveal some change in the transparency of the apices. It cannot be denied that, in many cases, where there are respiratory abnormalities, coughing, wasting, and an unstable condition of the body-temperature, when, furthermore, the eye or skin reaction is positive, the apices preserve their normal transparency. In such cases one is justified, in my opinion, in speaking of incipient tuberculosis; whereas, when the fluoroscope shows some darkening of an apex, it is more probable that the infection is already older than it looks. So far, the fluoroscope helps us in some way to answer the difficult question whether, in a given case, the tuberculous infection of the aspect is or is not at an early stage. Nevertheless, the delicate methods of auscultation and percussion, as worked up specially by Grancher, are certainly nowadays the best means of detecting the earlier stages of lung tuberculosis.

I think, however, that, in the near future, the Roentgen methods will enable us to make a more accurate investigation of incipient cases. But here radiography, rather than fluoroscopy, will have to take the lead. Skiagraphs of a limited area of the lung, taken within a very short length of time, so as to avoid the perturbation caused by the respiratory movements, have been made recently by A. Schönberg (of Hamburg) in observing some technical precautions which it would be tedious to explain here. They

show with unsurpassed clearness details of structure which cannot be seen on ordinary skiagraphs, and I am confident that this method will prove some day a great improvement in the investigation of early tuberculosis. But it belongs to the future rather than to the present.

I wish this paper may have convinced you that Roentgen stethoscopy is able to give us valuable information in almost every case of tuberculosis of the lung. It always adds some precision to clinical investigation, the conclusions of which it often corroborates and sometimes reforms. I have devoted many years to the study of the disease of the chest, satisfying myself with the commonly received opinion that the older stethacoustic methods, when correctly applied, give us any information we may want. Since I have been acquainted with the Roentgen methods, I have come to consider that no case can be said to have been thoroughly and completely examined if the information given by the fluoroscope has not been taken into account.

ÜBER DEN WERT DER RÖNTGENUNTERSUCHUNG FÜR DIE DIAGNOSE DER LUNGENTUBERKULOSE.

(MIT BESONDERER BERÜCKSICHTIGUNG DER FRÜHTUBERKULOSE.)

Von Prof. Dr. Paul Krause,
Jena.

Ueber den Wert der Röntgenuntersuchung zur Erkennung der Frühtuberculose der Lungen haben sich fast alle bekannteren Röntgenologen geäussert: ausser *Prof. Rieder* nenne ich von Deutschen *Albers-Schönberg, A. Kohler, Holzknecht, Immelmann, Levy-Dorn, Bade, Hildebrandt, Gocht, Schellenberg, Grunmach,* von den Amerikanern *Williams* und *Walsham,* von den Franzosen *Beclorê.* Auch heute noch sind die Ansichten über den Wert der Methoden keineswegs geklärt. Ein Fortschritt ist aber seit Jahren zu verzeichnen, nämlich dass die Enthusiasten zum Schweigen gebracht worden sind, welche in der ersten Zeit der Röntgenära, wenn man sie sprechen hörte, bei weniger Kundigen den Glauben erwecken konnten, man brauche nur den Röntgenschirm in die Hand zu nehmen, um auch kleinste Veränderungen in den Lungenspitzen als Tuberculose zu erkennen. Heute verhält sich der grösste Teil der Aerzte ablehnend gegenüber der Röntgenuntersuchung bei der Frühtuberculose der Lungen, meiner Ansicht nach mit Unrecht. Es liegt das zum grössten Teil daran, dass man von vornherein von der Röntgendiagnostik mehr verlangt, als sie *a priori* zu leisten vermag: sie kann nie und nimmer eine mit sämmtlichen klinischen und bakteriologischen Untersuchungsmethoden nicht mögliche Diagnose zu einer absolut sicheren machen; ich glaube auch trotz aller noch zu erwartenden Fortschritte der Technik, das wird sie nie leisten können.

Das ist auch gar nicht anders zu erwarten. Wie häufig erleben wir es, dass auch andere Methoden, z. B. die chemischen, bakteriologischen, selbst die anatomischen nicht in der Lage sind, klare Auskunft über pathologische Verhältnisse zu geben; auch dabei ist häufig das Endergebnis: *non liquet.*

Ich beabsichtige nicht, die Ansichten aller Autoren, wie ich sie aus ihren Arbeiten und zum Teil aus eigenen Aeusserungen kenne, hier kritisch gegenüberstellend vorzutragen.

Ich will mit Berücksichtigung der Forschungsergebnisse anderer Autoren, auf eigenen, sehr ausgedehnten Erfahrungen, welche ich in dem Krankenhause

Hamburg-Eppendorf, in der medizinischen Klinik in Breslau und in der medizinischen Poliklinik in Jena sammeln konnte, fussend, mitteilen, in welcher Weise und inwieweit mir die Röntgendiagnose bei der Frühtuberkulose der Lungen Dienste geleistet hat.

I.

Zuerst ein paar Worte über die Technik der Röntgenuntersuchung von Lungenkranken.

Bei einem grösseren Betriebe, besonders wenn es sich um ambulante Kranke handelt, ist die Röntgendurchleuchtung in erster Linie anzuwenden, die Röntgenphotographie kostet zu viel Zeit und Geld und ist deshalb nur für besondere Fälle zu reservieren. Will man die Schirmuntersuchung in richtiger, gewinnbringender Weise ausüben, so müssen folgende Punkte berücksichtigt werden:

1. Das Untersuchungszimmer muss in vollkommenster Weise verdunkelt werden können; eine Untersuchung in einem Zimmer, in welchem man durch einfallendes Tageslicht alle Gegenstände erkennen kann, ist durchaus unzureichend und meiner Meinung nach unmöglich; trotzdem sah ich in einigen Röntgenlaboratorien, auch in dem letzten Jahre noch, dass diese wichtige Vorbedingung zum Gelingen einer Untersuchung nicht vollständig erfüllt war.

2. Die Röntgenröhre muss in einem vollständig lichtdichten Kasten untergebracht sein, sodass das fluoreszierende Licht der Röntgenröhre vollständig verdeckt wird.

Die früher gebräuchliche Abdeckung der Röntgenröhre mit Hilfe eines schwarzen Tuches erweist sich als völlig unzureichend. Auch die Unterbringung der Röntgenröhre in einer Pappschachtel oder hinter einem Schirm ist ungenügend.

Will man feinste Unterschiede im Fluoreszenzlichte des Röntgenschirmes machen, so ist es unbedingt erforderlich, dass keinerlei andere Lichterscheinungen störend eingreifen; trotz in Betrieb befindlicher Röhre muss also das Zimmer völlig dunkel bleiben.

3. Der Durchleuchtungskasten muss zum Schutze gegen schädliche Einwirkungen der Röntgenstrahlen im Intresse des Patienten und des Untersuchers mit Bleischutz versehen sein.

4. Der Kasten muss leicht beweglich aufgehängt sein, um die Röhre ohne Mühe verschieben zu können.

5. Es muss eine möglichst gute Blendenvorrichtung angebracht sein; nach meinen Erfahrungen ist die Schlitzblende für Lungenspitzendurchleuchtungen den Rundblenden bedeutend überlegen.

Dass ein guter hell-leuchtender Baryumplatincyanürschirm dazu gehört, um gute Ergebnisse zu erhalten, ist selbstverständlich, ebenso, dass das

Auge des Untersuchers ausgeruht sein muss, sodass es sich der Dunkelheit völlig adaptiert hat. Gegen letzteres wird häufig von uns allen gefehlt, da die Zeit zum Warten in dem eiligen Getriebe einer grösseren Klinik oder Poliklinik fehlt. Und doch muss bei zweifelhaften Untersuchungsresultaten die Zeit gefunden werden; man sollte wenigstens 3–5 Minuten im dunkeln Zimmer, je nachdem man aus hellerem oder weniger hellerem Tageslicht kommt, die Netzhaut ausruhen lassen, ehe man zur Untersuchung schreitet; die Fähigkeit, auf dem Röntgenschirme feine Unterschiede zu sehen, wird durch diesen kleinen Zeitverlust sehr erheblich gesteigert.

Muss die Röntgenphotographie angewandt werden, so tut man nach dem Vorgange von Albers-Schönberg gut daran, Blendenaufnahmen anzufertigen; wenn möglich, im dorso-ventralen und ventro-dorsalen Durchmesser. In der letzten Zeit verwandte ich mit Vorteil den von Albers-Schönberg angegebenen Untersuchungsstuhl für die Aufnahmen: erst wurden mit der Schlitzblende die Lungenspitzen in sitzender Stellung des Kranken in bester Weise eingestellt, nach erfolgter Fixation die Platte eingesetzt und bei vollbelasteter Röhre 15–20 Sekunden exponiert. Doch geben auch Rundblendenaufnahmen gute Resultate.

II.

Da wir bei der Frühtuberculose erwachsener Lungenkranken eine Helligkeitsdifferenz der Lungenspitzen erwarten, ist es erwünscht und wertvoll, darüber Bescheid zu wissen, ob bei Menschen, bei denen wir mittelst einwandfreier Percussion und Auskultation keine Differenz in Bezug auf den Spitzenbefund finden, Differenzen betreffend die Helligkeit und Ausdehnung der Lungenspitzen vorhanden sind.

Ich habe 80 frühere von mir erhobene Befunde zur Beantwortung dieser Fragen durchgesehen und ausserdem mit Dr. Friedrich zusammen unter unserem reichen Krankenbestande—wir hatten im vergangenen Jahre 5880 Kranke in der medizinischen Poliklinik in Jena—zirka 180 geeignete Fälle ganz besonders daraufhin untersucht.

Ich erinnere kurz daran, dass es fraglos Umstände giebt, welche bewirken, dass normale Lungenspitzen bei der Röntgendurchleuchtung dunkel erscheinen. Dazu gehören:

1. Veränderungen des Integuments (Sklerodermie, Oedeme der Haut).
2. Starke Vermehrung des subkutanen Fettgewebes (allgemeine Adipositas, Lipombildung).
3. Vergrösserte, verkäste, indurierte, verkalkte Lymphdrüsen, welche in der Fossa supraclavicularis oder in den oberflächlichen, respektive tiefen Nackenregionen gelegen sind.
4. Auffallend stark entwickelte Muskulatur; ist sie auf der rechten Seite besonders stärker als links, so ergiebt sich daraus eine auch röntgenoskopisch nachweisbare Differenz.

5. Trotz Fehlens der Punkte 1–4 sieht man hin und wieder dunkle Lungenspitzen infolge davon, dass der Schatten der Klavikula und der beiden ersten Rippen sich decken, oder die Lungenspitzen auffallend tief stehen.

Wenn man diese Ausführungen berücksichtigt, wird man vor der Urteilsfällung (oder sogar wenn man allein zu untersuchen hat, vor der Röntgendurchleuchtung überhaupt) über den Ausfall des Röntgenbefundes eine genaue Inspektion und Palpation vornehmen, um die Fehlerquellen zu vermeiden.

Nach meinen Erfahrungen bestehen aber auch bei nicht nachweislich Lungenkranken, bei denen diese Fehlerquellen auszuschliessen sind, geringe Unterschiede in Bezug auf die Helligkeit der Lungenspitzen. Sie sind zwar nur gering, doch werden sie mich in Zukunft regelmässig veranlassen, in zweifelhaften Fällen die röntgenoskopische Untersuchung durch das Röntgenogramm zu kontrollieren. Auch in Bezug auf die Ausdehnung und den Höhenstand der Lungenspitzen finden sich bei der Röntgenuntersuchung geringe Differenzen bei nachweislich nicht Lungenkranken. Ich will kurz darauf hinweisen, dass in einer unter Prof. Dr. Gerhardts Leitung ausgeführte Untersuchungsreihe Dr. Seufferheld an dem Krankenmaterial der medizinischen Poliklinik in Jena auch mit Hilfe der physikalischen Untersuchungsmethoden entsprechende Resultate (geringere Schalldifferenzen, Abweichungen des Atemgeräusches) bei der Spitzenuntersuchung gefunden hat, und ferner darauf hinweisen, dass, wie aus den interessanten Untersuchungen Krönigs erhellt, angeborene, noch wenig bekannte Missbildungen der Lungenspitzen (Heteromorphien und Heterotopien) vorkommen, welche auch röntgenoskopische Differenzen erzeugen können.

III.

Was können wir unter Berücksichtigung der eben erwähnten Punkte mit der Röntgenuntersuchung bei der Frühtuberculose der Lungen leisten?

A. *Frühtuberculose der Erwachsenen.*—Handelt es sich um Erwachsene, so suchen und finden wir mit den klinischen Untersuchungsmethoden meist einen Prozess der Lungenspitzen und zwar bei Frühfällen häufig nur einen Katarrh, bei weiter fortgeschrittenen Fällen infiltrative Prozesse, in einer grossen Anzahl nur unbestimmte Befunde (Schalldifferenzen, unbestimmtes, rauhes Atmen, verlängertes Exspirium).

Sind Infiltrationen vorhanden, so ist lufthaltiges Gewebe durch luftleeres respt. luftarmes ersetzt. In solchen Fällen sehen wir, wenn die Infiltration eine gewisse Ausdehnung erreicht hat, an Stelle von Helligkeit je nach der Ausdehnung des Prozesses tiefe oder weniger tiefe Schatten.

Reichen die Infiltrationen bis an die oder in die Nähe der Oberfläche der Lungenspitzen, so werden wir sie perkussorisch (respt. auskultatorisch) und

röntgenologisch nachweisen können. Finden sie sich in der Mitte der Spitze, ohne ihrer Oberfläche nahezukommen, oder haben sich, wie ich in einigen Fällen als Erklärung bei der Sektion fand, vereinzelte, auffallend konfluierende grosse Emphysemblasen über dem infiltrativen Prozesse gebildet, so sind sie perkussorisch nicht nachweisbar, dagegen in trefflicher Weise auf dem Röntgenschirme und der Röntgenplatte zu sehen. Ich verfüge über derartige Untersuchungsbefunde, wodurch unser klinischer Befund in nicht erwarteter Weise unterstützt respt. ergänzt wurde.

Auch in vielen Fällen, in welchen wir perkussorisch einwandfreie Dämpfung hatten, und dementsprechend eine Schattenbildung erwarteten, bekamen wir eine Ergänzung unseres klinischen Befundes insofern, als sich die Ausdehnung des infiltrativen Prozesses grösser erwies, als erwartet wurde.

Ich habe mich nach dem Vorgange von Albers-Schönberg überzeugt, dass es Infiltrationen giebt, welche auch bei guter Abblendung nicht oder nicht sicher bei der Röntgendurchleuchtung erkannt werden, dagegen zweifellos sichere Befunde auf der Platte, besonders bei Blendenaufnahmen geben.

Dazu gehören zum Teil Fälle, in welchen wir einen unbestimmten Perkussionsbefund oder auch nur Katarrh oder auch nur unbestimmten Perkussionsbefund und unbestimmtes Atmen hatten.

Gerade dabei bekommen wir nun Differenzen des Durchleuchtungsbildes der Lungenspitzen, wie wir sie auch bei nicht nachweislich Lungenkranken erhalten haben: bei solchen Kranken tritt die Plattenaufnahme in ihr Recht; sie ist dabei nicht zu entbehren.

Bei Patienten, welche auf Tuberculose verdächtige Spitzenbefunde zeigten, ohne ausgeprägten auskultatorischen und perkussorischen Befund zu haben, sahen wir wiederholt ganz auffallende dunkle Spitzen, welche sich auch bei tiefster wiederholter Inspiration nicht aufhellten; auch hierbei ergab die photographische Platte wiederholt nicht nur einen reduzierten Luftgehalt, erkennbar an einem nebelhaften Schatten, sondern zirkumskripte, anscheinend in der Tiefe gelegene Infiltrationen.

Sind beide Lungenspitzen in gleichem aber geringem Masse verdunkelt, so bin ich mit der röntgenoskopischen Diagnose sehr zurückhaltend geworden, seitdem ich mehrere Male erreicht habe, dass durch systematische ein- bis zweiwöchentliche Atemübungen die Lungenspitzen sich sehr beträchtlich aufgehellt hatten.

Was nun den Höhenstand der Lungenspitzen anbetrifft, so ist auf geringe Differenzen kein Wert zu legen; handelt es sich um Unterschiede von 1–2 cm., so wird man besonders, wenn auch Helligkeitsunterschiede vorhanden sind, auf schrumpfende Prozesse schliessen dürfen. Auch auf den Breitendurchmesser der Spitzen (im sagittalen Durchmesser) habe ich röntgenographisch geachtet, nachdem Krönig weiteren ärztlichen Kreisen die Wichtigkeit der Feststellung dieser mittels Perkussion gelehrt hat.

Seit Freund wiederum auf die Verknöcherung des Rippenknorpels der 1. Rippe in ihrer Bedeutung für die Entstehung der Lungentuberculose hingewiesen hat, lag es nahe, auch röntgenographisch den Nachweis der frühen Verknöcherung des Rippenknorpels zu führen. Immelmann und F. M. Groedel haben sich speziell damit beschäftigt und über aussichtsreiche Erfahrungen berichtet; es dürfte sich empfehlen, darüber weitere Studien anzustellen.

Eine gewisse Bedeutung schien vor Jahren das von Williams mitgeteilte Symptom des Nachschleppens der Zwerchfellbewegung auf der erkrankten Seite und zwar in einem frühzeitigen Stadium der Frühtuberculose erlangen zu sollen. Trotz anderseitigen Mitteilungen kann ich persönlich diesem Symptom keine differentielle Bedeutung beimessen; ich habe es in weit über die Hälfte der Fälle vermisst, und halte mich nach speziellen, zu diesem Zwecke ausgeführten Messungen der Exkursionsbreite der Zwerchfellbewegung zu machen. Mir scheint das Williams'sche Phänomen zur Zeit noch nicht zur Unterstützung der Frühtuberculose der Lungen Verwendung finden zu können.

Stellen wir uns nun die Frage, ob die durch die Röntgenuntersuchung festzustellenden Symptome die bestimmte Diagnose gestatten, ob die gesehenen Veränderungen in spezifischer Weise als Tuberculose zu deuten seien, oder ob sie auch bei Erkrankungen anderer Genese vorkommen, etwa bei Staubinhalation, bei Anthrakose, so ist darauf nur mit einer gewissen Vorsicht zu antworten. Meiner Meinung nach haben diese Prozesse nichts spezifisches; meiner Meinung nach können wir mit Röntgenlicht tuberculöse Prozesse *sensu strictiori* nicht sehen, sondern nur die durch die Tuberkelbazillen verursachten Gewebsverdichtungen—daraus ergiebt sich ohne weiteres, dass wir zur Stellung der Diagnose "Tuberculose" der klinischen Untersuchungsmethoden bedürfen; der Röntgenbefund genügt nie und nimmer, er vermag auch nicht zu eruieren, ob die bestehenden Veränderungen aktiv oder passiv sind. Damit prozessiere ich die Röntgenuntersuchung als eine Methode, welche etwa ebenbürtig der bakteriologischen, ebenbürtig der Perkussions- und Auskultationsmethode anzusehen ist, aber gleich diesen allein zur Stellung der klinischen Diagnose Tuberculose nicht ausreicht.

B. *Frühtuberculose der Kinder und jugendlichen Personen.*—In sehr vielen Fällen finden wir die Lungenspitzen frei von krankhaften Prozessen, wir wissen vor allem auch durch anatomische Erfahrungen, dass die Lungentuberculose von Kindern und jugendlichen Personen an den Hilusdrüsen beginnt. Die klinischen Untersuchungsmethoden versagen in vielen Fällen den Dienst oder geben vieldeutige Resultate.

Durch die Röntgendurchleuchtung—gute Abblendung ist durchaus unerlässlich—respektive Röntgenphotographie können in einwandfreier Weise Veränderungen an den Hilusschatten nachgewiesen werden (vergrösserte, verkalkte Drüsenschatten), welche auf andere Weise nicht zu entdecken sind.

Auf eine Form der Frühtuberculose im jugendlichen Alter will ich Ihre Aufmerksamkeit noch lenken. Nicht selten sehen wir solche Kranke mit allen Symptomen der zentralen Pneumonie (hohes Fieber, hoher Puls, nubiginöses Sputum, Pneumokokkenbakteriämie). Bei der Durchleuchtung können wir einen tiefen Schatten von mehr oder minder grosser Ausdehnung nachweisen. Nach einer Anzahl von Tagen (5–9) tritt Entfieberung auf, bei der Durchleuchtung (und Photographie) erkennt man aber, dass der Schatten sich nicht aufgehellt hat, sondern im Laufe der nächsten Wochen an Ausdehnung zunimmt, häufig sieht man vorher strangförmige Schatten nach der Peripherie strebend. In meinen Fällen bewies das allmählich wieder eintretende Fieber und schliesslich das Auftreten von Tuberkelbazillen im Sputum, dass es sich tatsächlich um Tuberculose gehandelt hat. Dieser Verlauf scheint im jugendlichen Alter nicht selten zu sein.

Zur Erkennung von Bronchialdrüsentuberculose ist die Röntgenuntersuchung durchaus unerlässlich.

Leitsätze: (A) Was leistet die Röntgenuntersuchung bei der Frühtuberculose der Erwachsenen?

1. Perkussorisch nachweisbare infiltrative Prozesse der Spitzen, die eine gewisse Ausdehnung haben, geben bei der Durchleuchtung einen mehr oder minder tiefen Schatten.

Die Röntgenuntersuchung ist insofern der klinischen häufig überlegen, als sie dartut, dass der Prozess in vielen Fällen ausgedehnter ist, als vermutet wurde.

2. Perkussorisch nicht oder nur unsicher nachweisbare Infiltrationen können häufig durch die Durchleuchtung oder bei zweifelhaften Durchleuchtungsresultate sicher noch durch die Röntgenphotographie (Blendenaufnahme) nachgewiesen werden; auch hierbei wird nicht selten entdeckt, dass es sich um weiter fortgeschrittene Fälle handelt, als erwartet wurde.

3. Rein katarrhalische Prozesse im Frühstadium sind weder röntgenoskopisch noch röntgenographisch nachweisbar; bei länger bestehendem Katarrh sieht man infolge schlechteren Luftgehalts bei der Durchleuchtung dunklere Spitzen, welche sich inspiratorisch nicht aufhellen; bei praktisch wichtigen Fällen sollte stets die Photographie (Blendenaufnahme der Spitzen) herangezogen werden (häufig beginnende infiltrative Prozesse, welche auf andere Weise nicht nachweisbar sind).

4. Höhenstand der Lungenspitzen (in zweifelhaften Fällen orthodiagraphische Messungen) spielt nur bei Differenzen von 1–1½ cm. eine Rolle, Breite der Lungenspitzen ist noch nicht genügend röntgenographisch studiert, um diagnostisch Verwendung zu finden.

Die Verknöcherung der 1. Rippe ist mittels Blendenaufnahme gut nachweisbar und im Sinne Freunds als Zeichen bei der Frühtuberculose zu verwenden.

Die respiratorische Aufhellung der Lungenspitzen, welche bei Gesunden vorhanden ist, fehlt häufig einseitig oder doppelseitig bei der Frühtuberculose.

Die Zwerchfellbewegung ist vielfach mangelhaft; ein einseitiges Zurückbleiben des Zwerchfells auf der erkrankten Seite (Williams'sches Phänomen) kann als besonderes Symptom nicht anerkannt werden und ist daher diagnostisch nicht zu verwerten (orthodiagraphische Messungen erforderlich).

Stellung der Rippenschatten im Röntgenbilde ist diagnostisch nicht oder nur mit Vorsicht zu verwenden.

(B) Was leistet die Röntgenuntersuchung bei der Frühtuberculose der Kinder und Jugendlicher Personen?

In den meisten Fällen fehlen dabei Lungenspitzenbefunde; desto wichtiger ist der Nachweis der Veränderungen der Hilusschatten (vergrösserte Bronchialdrüsenschatten infolge von Indurationen, Verkäsung, Verkalkung, infiltrative Prozesse in der Umgebung des Hilus und der Bronchien); recht häufig hat der Vortragende dabei das Bild der zentralen Pneumonie infolge Pneumokokkenmischinfektion gesehen, trotz Entfieberung geht röntgenoskopisch der Prozess langsam weiter vorwärts und wird nach Wochen auch perkussorisch und auskultatorisch (und bakteriologisch) als Tuberculose erkannt.

Was nun die *vorgeschrittenen Prozesse bei der Lungentuberculose* anbetrifft, so giebt die Röntgendiagnostik sehr gute, häufig überraschende, den klinischen Befund ergänzende Bilder, sowohl bei der Durchleuchtung, wie bei der Photographie. Wir sehen da häufig, wie wir das ja aus den Erfahrungen am Sektionstische wissen, dass der tuberculöse Prozess bedeutend weiter vorgeschritten ist, als wir nach unserer klinischen Untersuchung annahmen. Bestehen, wie so häufig, ausgedehnte *peribronchitische Infiltrationen* um die *Hauptbronchien der Unterlappen* herum, so sind im Röntgenlichte sehr charakteristische Bilder zu erzielen.

Auch jene *Infiltrationsherde*, welche sich um die *Bronchialdrüsen* entwickeln (klinisch beginnen sie nicht so selten unter dem Bilde einer zentralen Pneumonie), sind mittels der Röntgendiagnostik sicher aufzufinden und anscheinend auch sicher als tuberculös zu deuten, wenn sie in direktem Zusammenhange mit den Bronchialdrüsenschatten stehen, besonders im jugendlichen Alter. Als eine wertvolle Bereicherung unserer Diagnostik muss es bezeichnet werden, dass es uns durch die Röntgenstrahlen ermöglicht worden ist, die Bronchialdrüsentuberculose, bei der wir früher in der Deutung des Krankheitsbildes auf Vermutungen angewiesen waren, sicher zu erkennen. *Verkreidete* oder *verkalkte Herde oder Drüsen* sind sowohl am Hilus, wie innerhalb der Lungen ausserordentlich scharf zu sehen; sie heben sich häufig so scharf wie Projektile ab.

Schwieriger gestaltet sich die Diagnose der *schieferig indurierten* und *markig geschwollenen Drüsen;* erstere geben bei genügender Abblendung scharfe Bilder; ihre Deutung erfordert allerdings einige Uebung; markig geschwollene oder käsige Drüsen heben sich nur dann von dem Lungengewebe ab, wenn es sich um ganz grosse Packete handelt, welche sich weit in das helle Lungengewebe hinein erstrecken.

Doch muss ich gerade bei der Röntgendiagnose der Bronchialdrüsentuberculose eine sorgfältige klinische Beobachtung mit Zuhilfenahme aller uns bekannten Methoden (Tuberculinreaktion) als unbedingte Forderung erheben; das Röntgenbild wird uns zwar einen atypischen oder pathologischen Befund an den Hilus- oder Lungenlymphdrüsen zeigen; ob es sich aber um einen aktiven frischen oder passiven alten Prozess handelt, kann nur durch die klinische Beobachtung entschieden werden. Mit grosser Sicherheit können wir auf der Photographie, seltener allerdings bei der röntgenoskopischen Untersuchung *Kavernen* diagnostizieren, auch solche, welche wegen ihrer tiefen Lage sonst der Diagnose nicht zugänglich sind.

Jene Formen der Tuberculose, welche von vornherein unter dem Bilde der *käsigen Pneumonie* verlaufen—Lappendämpfung, starkes bronchiales Atmen, häufig längere Zeit ohne Katarrh—scheinen weniger intensive Schatten zu geben, als die kroupöse Pneumonie, ich habe es allerdings nur in zwei Fällen (mit Obduktionsbefund) konstatieren können.

The Value of Roentgen-ray Examination in the Diagnosis of Pulmonary Tuberculosis, with Special Reference to Early Tuberculosis.—(KRAUSE.)

Early Tuberculosis in Adults.—(1) Infiltration at the apices sufficiently extensive to be demonstrated by percussion produces a more or less deep shadow. The X-ray examination is superior to the physical diagnosis, inasmuch as it shows that in many cases the process is more extensive than was at first supposed.

(2) Infiltrations that cannot be demonstrated by percussion can often be demonstrated by means of an X-ray photograph.

(3) Simple catarrhal processes in the early stage cannot be demonstrated either by the fluoroscope or by taking an X-ray photograph. Later the apices, owing to the diminished amount of air, appear dark and do not clear up during inspiration.

(4) The level of the apices, which in doubtful cases may be determined by orthodiagraphic measures, is of no importance unless the difference exceeds from 1 to 1½ cm. The width of the apices has not been sufficiently studied with the X-ray to be considered a diagnostic point of any value. Ossification of the first rib is readily demonstrated by means of the

X-ray and, after Freund, may be utilized as a sign of early tuberculosis. The normal clearing up of the apices during respiration is often absent on one or both sides in early tuberculosis. The position of the shadow of the ribs in the X-ray picture can only be utilized with great caution, if at all.

Early Tuberculosis in Children and Youthful Individuals.—Changes in the apices are usually not found, but alterations of the shadow at the hilus, indicating the presence of indurated caseous or calcified bronchial glands, or infiltrative processes in the neighborhood of the hilus of the bronchi, are, on the other hand, most important. The author has frequently seen the picture of a central pneumonia due to a mixed infection with pneumococci progressing slowly in spite of the disappearance of the fever, and after weeks being recognized as a tuberculous process by percussion and auscultation and bacteriologic examination.

(1) The X-ray examination frequently reveals the infiltrative process with a perfection which closely approximates that of the autopsy table. (2) Cavities of every size, from that of a pea upward, whether superficial or deep-seated, as well as calcified foci, reveal themselves in the X-ray photograph. (3) Sources of error arise from the fact that shadows at different depths in the lungs overlie one another. In many cases infiltrative processes of a non-tuberculous origin (tumors of the lung, bronchiectasis, pulmonary abscess, pulmonary gangrene) can be differentiated. In the main, however, the X-ray diagnosis merely confirms or completes the clinical findings.

Valeur de l'Examen par les Rayons-X dans le Diagnostic de la Tuberculose pulmonaire and spécialement de la Tuberculose commençante.—(KRAUSE.)

A. *Tuberculose Commençante Chez Les Adultes.*—1. Une ombre plus ou moins nette est jetée par l'infiltration des sommets, dont l'étendue est suffisante pour être constatée à la percussion. L'examen par les rayons-X a plus de valeur que les signes physiques, en ce qu'il démontre que dans maints cas le processus se répand plus loin qu'on ne s'y attendait à première vue.

2. On peut souvent constater par les rayons-X des infiltrations (qui ne se révelent pas à la percussion).

3. Dans la première période on ne saurait constater les processus catarrhaux non compliqués, ni par le fluoroscope ni par une photographie aux rayons-X. Plus tard, les sommets, grace à la diminution de la quantité d'air, continuent à paraître sombres et ne s'éclaircissent que pendant l'inspiration.

4. La différence de niveau des sommets, quand elle ne s'élève pas au-dessus de 1 centim. ½, n'offre pas d'importance. On peut la déterminer par les moyens orthodiagraphiques. Quant à largeur des sommets, elle n'est pas assez étudiée aux rayons-X pour avoir une importance diagnostique quelconque. On peut facilement constater aux rayons-X l'ossification de la première côté, laquelle selon Freund est un signe de la tuberculose commençante. L'éclaircissment des sommets pendant l'inspiration manque souvent dans les deux côtés ou quelquefois dans un seul côté. Même quand on se sert de la position de l' ombre des côtés dans le tableau aux rayons-X, il faut s'y prendre avec les plus grandes précautions.

B. *Tuberculose Commençante Chez Les Enfants et Chez Les Adolescents.* —On ne trouve pas ordinairement de changement aux sommets, mais les altérations des ombre au hilus sont au contraire très-importantes. Elles signifient l'existence d'indurations caséeuses ou la calcification des ganglions bronchiques, ou des infiltrations dans le voisinage du hilus ou des bronches. Malgré la disparition de l'élévation de la température, l'auteur a souvent eu le spectacle d'une pneumonie centrale à progrès lent, dérivée d'une infection mixte de pneumococque, et que, la percussion, l'auscultation et l'examen bactériologique ne révélaient comme tuberculeuse qu-après des semaines.

C. *Tuberculose avancée.*—(1) Les rayons-X mettent fréquemment en lumière le processus d'infiltration avec une précision qui se rapproche de celle de la nécropsie. (2) Les cavernes, aussi bien que les foyers calcifiés de toutes grandeurs, soit superficiels soit profondément situés, sont mis en lumière par les photographies au rayons-X. Les sources d'erreurs viennent du fait que les ombres de profondeurs différentes s'enchevauchent entre elles. Dans bien des cas, on peut différencier les processus infiltrants d'une origine non tuberculeuse, tumeur du poumon, la bronchiectasie, l'abcès pulmonaire, le gangrène des poumons. En somme, le diagnostic aux rayons-X ne fait qu'affirmer ou compléter les données cliniques, et se borne à la découverte des différences de densité dans l'intérieur des poumons.

THE VALUE OF HEMOPTYSIS AS A SYMPTOM OF EARLY PULMONARY DISEASE.

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I have been requested to lay before this Congress the diagnostic import of hemoptysis as a symptom of early pulmonary disease, and I shall consider that theme of inquiry only in relation to tuberculosis. Pertaining to the occurrence of this symptom in connection with many diseases other than tuberculosis, it may be merely remarked that the "rules of judgment" have been sufficiently well established to permit of a clear discrimination, as a rule. It must be recollected, however, that the diagnosis of blood-spitting due to either acute or chronic phthisis, unless with certain definite precautions, cannot be made, and also that a few cases may present doubt for the time being.

It is not a light matter to bring the known facts and data concerning hemoptysis and tuberculosis into adjustment, so that the best interest of medical diagnosis can be subserved. The subject does not lend itself readily to a numerical analysis, and few statistical examinations have been undertaken in the past, so that much of what will be submitted is necessarily based upon personal observation and conviction. Without stopping to consider the pathological changes on which the bleedings in the earlier stages of pulmonary tuberculosis depend, since this would lead too far afield, I shall discuss the subject, for convenience of study, under two heads: (*a*) Hemoptysis in early acute forms, and (*b*) in the early chronic forms. I quite agree with certain writers who contend that the particular form of pulmonary tuberculosis is not a proper basis for classification of cases of hemoptysis, but it is to be remembered that in this paper attention will be limited to early cases.

(*a*) *Hemoptysis in Early Acute Forms.*—(1) *Acute tuberculous pneumonia,* in which case the invasion of an entire lobe frequently occurs. In this form of tuberculosis hemoptysis is more or less free; it may take place early and may be the first symptom to arouse a just suspicion of the true nature of the disease-process. When, additionally, a clear history of previous tuberculous disease in either the patient or the antecedents is obtainable, then a strong bias toward the tuberculous nature of the pneumonic process

is justifiable. (2) *Acute tuberculous bronchopneumonia:* In this type of the affection initial hemoptysis is rather infrequent, and my personal experience furnishes but two instances of the sort. Tuberculous bronchopneumonia, however, may supervene upon the more chronic variety of pulmonary tuberculosis, in which case blood-spitting as an initial symptom is far from uncommon.

(*b*) *Hemoptysis in the Chronic Forms.*—Two well-defined clinical types will be considered: (1) *Chronic ulcerative pulmonary tuberculosis,* and (2) *fibroid phthisis.*

(1) In ulcerative pulmonary tuberculosis hemoptysis may occur, though rarely, in cases of incipient disease of the lungs in which the lesions are too slight to be recognized by means of the physical signs or an X-ray examination even. In some of these cases, at least, if we inquire particularly into the previous history, we find distinct evidence of a gradually increasing debility, associated with gastric disturbance; in other instances the perversion of health has taken the form of so-called chloro-anemia, or of a short, occasional dry cough, to which the patient had given no heed prior to the sudden occurrence of hemoptysis. These precursory conditions, although not recognized by either physician or patient before the accident, are of real clinical importance, and retrospectively serve to confirm the tuberculous nature of the blood-spitting.

In these cases hemoptysis, if genuine, and especially if it occur in young adults, assumes the utmost diagnostic importance, but should either a physical or an X-ray examination, or the sputum test, fail to reveal evidence of pulmonary disease, then all other causes of blood-spitting must be excluded with great care and caution before deciding in favor of the tuberculous nature of the underlying causative condition.

As well said of such cases by Hichens,* "if, however, no cause can be found, then the probability is that pulmonary tuberculosis is nevertheless the '*fons et origo mali.*'"

In this connection it is to be emphasized that while in primary hemoptysis the expectorated blood is usually bright red and frothy, it may, though rarely, present a different appearance. For example, the sputum may assume the form of small, rounded masses, which probably come from the alveoli and are deeply stained with blood of a purplish-red color. More rarely still, blood-casts of the small bronchi, resembling those expectorated in fibrinous bronchitis, are observed.

In general terms, it is only as a symptom, not as a pathognomonic feature, that hemoptysis has any general diagnostic value. While, therefore, in no case heralded by hemoptysis can we be absolutely certain that tuberculosis already exists, it will often be found to stand the ordeal when

* The Practitioner, March, 1907.

we take our bearings accordingly and skilfully prosecute its study. And although a microscopical examination of the blood expectorated in these early cases, as well as the symptoms and physical signs, give negative findings, the case is to be regarded as one of tuberculosis, or, at all events, until disproved by the tuberculin test or otherwise. It follows as an obvious corollary that the diagnostic significance of hemoptysis in the incipient stage of pulmonary tuberculosis must be dependent to an extent, at least, upon the relative incidence of the symptom (a question to which attention will be invited hereafter) during this period of the disease.

Clinicians are remarkably at one on the opinion that when pulmonary tuberculosis develops in the course of uncomplicated left-sided valvular heart disease, hemoptysis is a more common initial symptom than in the non-cardiac forms. This class of cases, however, is too small to give much added importance to this symptom as a diagnostic feature, however closely the question might be examined.*

Says Lawrason Brown: "In 60,650 cases of pulmonary tuberculosis collected from all sources, valvular disease of the heart occurred in 747 (1 per cent.)." The disease (pulmonary tuberculosis) occurs most frequently in pulmonary stenosis, and the fact is to be emphasized that while in such instances the condition is often latent, there is not shown any increased tendency to hemoptysis. On the other hand, the greater incidence of early hemoptysis is confined, so far as this association of complaints is concerned, to those cases in which pulmonary tuberculosis is secondary to disease of the mitral valve, *i. e.*, mitral regurgitation and mitral stenosis, and the combination is, comparatively speaking, rare. The pulmonary hyperemia of mitral disease most probably accounts for the strong disposition to blood-spitting when tuberculosis supervenes as a complication.

The percentage of cases in which hemoptysis is the earliest symptom to invite attention to pulmonary tuberculosis in general is still quite imperfectly known, although a number of limited statistical inquiries, which have been made in the past, may here be adduced.

J. J. Galbraith† advances statistically the suggestive fact that of 150 consecutive cases showing various symptoms during the period preceding diagnosis, 26 per cent. manifested hemoptysis with no physical signs.

W. H. Coffman‡ found hemoptysis to be the earliest symptom in 20 cases, or 8 per cent. out of a total of 256 cases examined at the Winyah Sanitarium. An analysis of 3010 cases of tuberculosis collected from the records of the Phipps Institute of Philadelphia by the writer showed 276 instances of early

* "The Association of Pulmonary Tuberculosis with Both Primary and Secondary Endocarditis," Am. Jour. Med. Sci., Jan., 1902.

† The Practitioner, Jan., 1907.

‡ New York Med. Jour., Feb. 2, 1907.

hemoptysis, or 9.1 per cent. Loomis found only four cases in one hundred that gave a history of hemoptysis in a person apparently in perfect health. Considered as a whole, the foregoing figures give an aggregate of 3506 cases, of which 338, or 9.6 per cent., manifested hemoptysis at the commencement of pulmonary disease.

Under these circumstances the symptom under discussion obviously takes high rank as a diagnostic feature. Moreover, cases in which suspicion is first aroused by this symptom are, as a rule, early placarded as undoubted instances of tuberculosis at the present day, in view of the refined methods of diagnosis in vogue, and usually before the sputum places their recognition beyond doubt. Says Loomis: "Where hemoptysis occurs, it represents in the vast majority of cases a demonstrable evidence of tuberculosis." The initial hemoptysis is sometimes slight and recovery from it prompt, to be followed by apparent health without demonstrable local lesions, but soon or late active tuberculosis almost invariably ensues. At least 90 per cent. of all patients who have hemoptysis develop at some later time pulmonary tuberculosis (Brown).*

Probably no symptom of early cases of pulmonary tuberculosis, considered alone, is so impressive as true hemoptysis in the study of individual examples of the disease. When blood-spitting is followed by suspicious clinical associations, such as cough, slight expectoration, circumscribed, dry pleuritis, and failure of general health, the grouping of features should be regarded as being almost pathognomonic. The time has come to clearly recognize that a reasonably certain diagnosis thus formulated, without physical signs of an obvious character, without fever or demonstrable tubercle bacilli in the sputum, calls for active and approved measures of treatment.

In a second and larger group of cases of chronic ulcerative pulmonary tuberculosis hemoptysis occurs after a considerable period of general ill-health, accompanied by cough, slight expectoration, fever, with or without night-sweats or chills. Here the blood-spitting strikingly confirms the suspected nature of the case in hand, and its occurrence may be followed by either an aggravation of symptoms and physical signs or marked temporary improvement. In these instances hemoptysis is conspicuous among the ushering-in symptoms on which an assured diagnosis of the disease rests—in one-fourth of all cases, at least. I would strongly urge the inoculation of bloody sputum into a guinea-pig when the microscope fails to reveal tubercle bacilli on repeated examinations in these cases.

Here should be mentioned hemoptysis occurring in the course of latent pulmonary tuberculosis. While this form is, comparatively speaking, rare, this accident leads to the discovery of well-marked physical signs.

* Osler's Modern Medicine, vol. iii, p. 330.

(2) *Fibroid Phthisis.*—It is only in occasional instances of this variety that early hemoptysis arises. When, however, it does intervene, copious bleeding may be witnessed and serve to afford striking confirmation of its tuberculous origin. Generally speaking, the diagnostic value of hemoptysis in fibroid phthisis is subordinate to that of its worth in the previous form.

In concluding, it would appear that the foregoing facts fully justify the following inferences:

1. That hemoptysis is probably the most conspicuous among the clinical manifestations that arouse suspicion as to their nature in early cases of acute pneumonic phthisis.

2. In about 10 per cent. of cases of chronic ulcerative pulmonary tuberculosis hemoptysis first directs attention to, and is almost invariably followed by, the demonstrable and conclusive evidences of the disease.

3. In not less than 25 per cent. of all cases of chronic pulmonary tuberculosis hemoptysis is among the ushering-in symptoms of the active, recognizable period of the affection.

4. In cases of fibroid phthisis and so-called latent tuberculosis its value as a symptom in the earlier stages is subordinate, since it does not often intervene, but may be profuse when it occurs.

5. When true hemoptysis occurs without assignable cause, it is to be regarded as being due to a tuberculous process.

La Hemóptisis Como un Sintoma Prematuro.—(ANDERS.)

Un diagnóstico positivo de la hemoptisis como principio de la tuberculosis pulmonar no puede hacerse con seguridad si no es con una precaucion definida, y algunos casos pueden presentar una duda temporaria. Las formas de hemoptisis que aparese en las otras enfermedades por lo general permite una descriminación clara y por lo tanto esta no sera considerada en la presente discucion. En la ausencia de evidencias estadisticas adecuadas, gran parte de lo que el autor expone en la presente discucion es basada sobre observaciones y convicciones personales.

Por conveniencia al estudio, el tema es discutido bajo dos formas: (*a*) Hemoptisis en la forma aguda prematura, y (*b*) En la forma crónica prematura. Debe hacerse mención que en la presente discución la atencion se limita a los casos prematuros. En la neumonia tuberculosa aguda, la hemoptisis puede ser el primer sintoma que da lugar a la sospecha del caracter verdadero de la enfermedad.

La hemoptisis inicial es, comparativamente hablando, poco frecuente en la forma aguda de la bronco-neumonía tuberculosa. Esta forma, sinembargo, puede sobrevenir durante el curso crónico de la tuberculosis pulmonar, cuando algunas veces se manifesta en el esputo de sangre.

Bajo la form a crónica el sintoma es considerado con relación a dos tipos clinicos bien distintos: (1) Tuberculosis cronica ulcerativa del pulmon, y (2) Tisis fibrinosa. En esta última forma, en casos caros solamente se presenta la hemoptisis prematura, mas cuando esta ocurre, el derrame puede ser copioso, lo cual confirma el origen tuberculoso de la afección.

En el otro grupo, tuberculosis pulmonar crónica ulcerativa, la hemoptisis es rara en los casos en los cuales las lesiones son tan ligeras que no son perseptibles por medio de los signos físicos ó bien por los rayos X. La importancia de preguntar acerca la historia previa con relación a la perversión de la salud general es indispensable. El periodo de la vida durante el cual ocurre la hemoptisis, puede tener una decidida significación etiológica.

La sangre por lo general es de un color rojo, mas raramente esta puede presentar un aspecto diferente.

Casos de hemoptisis en los cuales las evidencias clínicas y los resultados del laboratorio son negativos, deberan conciderarse de caracter tuberculosos mientras no se prueve lo contrario por medio de la reaccion de la tuberculina ó por otros metodos. La hemoptisis no es patogénica, sinembargo esta es de una importancia exceptional en el diagnóstico.

A fin de apreciar el valor diagnostico, la incidencia de los sintomas deben conocerse, puesto que casi invariablemente (90% de los casos. Brown) la hemoptisis es seguida tarde o temprano por las otras evidencias dela tuberculosis pulmonar. Se ha demostrado en otra parte que cuando la tuberculosis pulmonar se manifiesta durante el curso de ciertas insuficiencias del corazon, la hemoptisis se manifiesta con mas frecuencia como sintoma inicial que en las formas que no son cardiacas.

La investigacion colectiva del autor cubre un total de 3506 casos ce los cuales 338 o sea un 9.6% de los casos manifestaron hemoptisis al principio de la enfermedad.

La hemoptisis se presenta en 25% como un sintoma caracteristic e iniciativo de la tuberculosis cronica ulcerativa del pulmon. En un sentido general, el valor de la hemoptisis como un sintoma en el diagnostico de la tuberculosis pulmonar prematura, sin indebida tendencia a magnificar su importancia, es muy considerable.

Hämoptise als ein Zeichen einer beginnenden Lungenkrankheit.—(ANDERS.)

Eine positive Diagnose, dass eine Hämoptise durch eine beginnende Lungentuberkulose verursacht ist, kann nur mit Sicherheit gestellt werden, wenn vorsichtig vorgegangen wird. In einigen wenigen Fällen kann dieselbe

eine längere Zeit zweifelhalt bleiben. Hämoptisen, welche bei anderen Krankheiten nicht-tuberkulöser Art stattfinden, können für gewöhnlich klar unterschieden werden und kommen hier nicht in Betracht.

In Anbetracht dessen, dass keine verwerthbaren statistischen Beweise vorliegen, ist nachfolgendes auf eigene Beobachtungen und Überzeugungen gegründet.

Der Bequemlichkeit der Darstellung halber wird in Folgendem zweierlei auseinander gehalten werden: (*a*) Hämoptisen in beginnenden acuten Formen, und (*b*) Hämoptisen in beginnenden chronischen Formen. Es muss daran erinnert werden, dass wir uns an dieser Stelle nur auf Discussion beginnender Fälle beschränken. Bei acuter tuberkulöser Pneumonie kann die Hämoptise vielleicht das erste Zeichen sein, welches den begründeten Verdacht auf die wahre Natur der Krankheit lenkt.

Bei acuter tuberkulöser Broncho-Pneumonie ist Hämoptise am Anfange eine verhältnissmässig nicht häufige Erscheinung. Diese Krankheit kann aber während des Verlaufes einer chronischen Lungentuberkulose hinzutreten, dann ist es nicht ungewöhnlich, dass dieselbe mit Blutspeien eingeleitet wird.

In Bezug auf die chronischen Formen kann das Symptom in seinem Verhältniss zu zwei gut ausgeprägten klinischen Typen betrachtet werden: (1) Zur chronischen ulcerativen Lungentuberkulose, und (2) zur fibroiden Schwindsucht. Bei letzterer tritt Hämoptise nur gelegentlich, im frühen Stadium auf, dann aber können die Blutungen sehr stark sein und dienen als ziemliche Bestätigung des tuberkulösen Ursprunges der Krankheit.

In der grössten und wichtigsten Gruppe, welche als chronische ulcerative Lungentuberkulose classificirt ist, kommt Hämoptise selten in denjenigen Fällen vor, in welchen die Zerstörungen so gering sind, dass sie nicht durch physikalische Untersuchungen oder die X-Strahlen entdeckt werden können. Es kann nicht genug auf die Bedeutung der Nachforschungen, besonders in der Vorgeschichte der Krankheit, hingewiesen werden, nach etwaigen Störungen im Allgemeinbefinden. Die Altersperiode, in welcher Hämoptise vorkommt, kann eine wichtige Bedeutung haben.

Das ausgeworfene Blut ist gewöhnlich hellroth und schaumig; es kann aber, wenn auch selten, ein anderes Aussehen haben. Fälle von Hämoptise, in denen alle klinischen Befunde, und auch diejenigen im Laboratorium, negativ sind, müssen als tuberkulöser Natur angesehen werden, bis durch die Tuberkulin-Probe oder auf andere Weise das Gegentheil bewiesen ist. Die Hämoptise ist zwar kein pathognomonisches Zeichen, aber dennoch von äusserster Wichtigkeit als ein Cardinalsymptom.

In Anbetracht dessen, dass das Vorkommen dieses Symptoms fast ausnahmslos (in 90% aller Fälle, nach Brown), früher oder später von sichtbaren Zeichen der Lungentuberkulose gefolgt ist, sollten alle Umstände, welche

Bezug auf dasselbe haben, mit Bestimmtheit bekannt sein, damit der diagnostische Werth desselben abgeschätzt werden kann. Es ist an anderer Stelle gezeigt worden, dass wenn Lungentuberkulose sich im Verlaufe einer Mitralerkrankung einstellt, eine Hämoptise öfters als Anfangssymptom auftritt, als wenn keine Herzkrankheit vorliegt.

Das Untersuchungsmaterial des Verfassers umfasst 3506 Fälle, von denen 338 oder 9.6% Hämoptise als allererstes Anfangszeichen aufwiesen.

Hämoptise ist in 25% aller Fälle von chronischer ulcerativer Lungentuberkulose als eins von den am meisten characteristischen Symptomen vorhanden. Im allgemeinen gesprochen, muss die Hämoptise, ohne die Wichtigkeit derselben zu übertreiben, doch als ein bedeutend werthvolles Zeichen für die Diagnose beginnender Lungentuberkulose angesehen werden.

DIE PHYSIOLOGISCHE WIRKUNG DES HÖHENKLIMAS, MIT RÜCKSICHT AUF VORBEUGUNG UND BEHANDLUNG DER TUBERKULOSE.

Von Prof. N. Zuntz,
Berlin.

Ich betrachte es als meine Aufgabe, Ihnen ein kurzes Résumé der physiologischen Wirkung des Höhenklimas zu geben und anzudeuten, welche prophylaktischen und Heilwirkungen sich daraus ableiten lassen. Ich benutze dabei die recht umfangreiche Literatur über Höhenwirkungen, als deren wichtigste Autoren ich nennen möchte: Jourdanet, Paul Bert, Viault, Miescher und seine Schüler, Mossu und von meinen Mitarbeitern Löwy und Durig.

Als wirksame Faktoren des Höhenklimas kommen in Betracht, die Luftverdünnung, welche bewirkt, dass im gleichen Volum Atemluft weniger Sauerstoff enthalten ist; welche ferner eine schnellere Verdunstung des Wassers bewirkt und eine grössere Durchlässigkeit der Luft für Licht und Wärmestrahlen. Letztere führt dazu, dass starke Temperaturgegensätze zwischen Sonne und Schatten, zwischen Tag und Nacht bestehn.

Der verminderte Sauerstoffgehalt der Luft führt zu einer weniger vollkommenen Sättigung des Hämoglobins mit Sauerstoff. Da das Venenblut normal noch fast zwei Drittel der Sauerstoffmenge enthält, welche die Arterien den Organen zuführten, sollte man erwarten, dass eine geringe, kaum 15 Prozent des ganzen Wertes betragende Abnahme dieses Sauerstoffgehaltes gleichgültig sei. Das ist aber deshalb nicht der Fall, weil die Blutversorgung der einzelnen Organe und im Anschluss daran der Sauerstoffgehalt des ihnen entströmenden Venenblutes stark wechselt, so dass in einzelnen Gebieten schon bei geringer Minderung des arteriellen Sauerstoffes Mangel an diesem entsteht. Dieser Mangel weckt die Tätigkeit der Regulations-Mechanismen in unserem Körper. Zum Teil handelt es sich dabei um vasomotorische Regulationen und um Anpassung der Herztätigkeit und der Atemmechanik an der Bedarf. Zum Teil aber, und das ist ein therapeutisch sehr wichtiges Moment, wird eine vermehrte *Neubildung der roten Blutkörperchen* ausgelöst. Dieselben vermehren sich schon nach wenigen Tagen des Höhenaufenthalts um so stärker, je bedeutender die Höhe ist (bis zu einer gewissen Grenze), bei der ernstere Schädigungen eintreten. Es ist eine bekannte Tatsache, dass länger anhaltender Sauer-

stoffmangel durch eine Art Nekrobiose von Gewebszellen eine Steigerung des Eiweisszerfalles bewirkt. Eine solche Steigerung erheblicheren Umfangs constatierten wir bei mehreren Personen auf dem Gipfel des Monte Rosa (4 5 6 Om), bei anderen war auch in dieser die therapeutisch selbst in den Tropen in Betracht kommenden Höhengrenzen weit übersteigende Höhe eine solche Wirkung nicht zu beobachten. Das schliesst aber nicht aus, dass kleine Gewebspartien schon in den therapeutisch benützten Höhen vom Sauerstoffmangel derart betroffen werden, dass die schlechtest gebärten Zellen zerfallen. So dürfte der Höhenaufenthalt eine gewisse Regeneration der Gewebe unter Ausschaltung des Minderwertigen herbeiführen. Diese Schädigung aber führt zu kompensatorischer Regeneration, welche nicht nur den Schaden repariert, vielmehr einen Ueberschuss resistenterer Zellen schafft. Als Symptome dieser Regeneration, d. h. eines starken Anreizes zum Wachstum der Gewebe beobachten wir im Stoffwechselversuch einen erheblichen Ansatz an Eiweiss. Die vorher erwähnte Neubildung roter Blutkörperchen ist nur eine Teilerscheinung dieses Regenerationsprozesses. Wesentlich beteiligt bei seiner Erzeugung ist auch das intensive Licht der Höhen. Im Anschluss an ältere Versuche hat Oerum in Kopenhagen gezeigt, dass durch die Belichtung im allgemeinen und speziell durch das in der Höhe reicher vertretene blau-violette Licht die Neubildung der Blutkörperchen mächtig angeregt wird.

Sowohl in der Ruhe, wie auch bei der Muskeltätigkeit bestimmter Stärke ist im Höhenklimat die Lungenventilation verstärkt, offenbar als zweckmässige Reaktion auf den Sauerstoffmangel. Diese verstärkte Lungenventilation ist für die Heilwirkung des Höhenklimas auf Tuberkulose von wesentlicher Bedeutung, denn sie wirkt der Stagnation von Sekreten in den erkrankten Lungenabschnitten entgegen. Nicht bedeutungslos dürfte hierbei sein, dass die verstärkte Ventilation in der Höhe mehr durch die oberen Abschnitte des Thorax als durch das Zwerchfell bewirkt wird. Sowohl Versuche in Räumen mit künstlich verdünnter Luft wie auch Selbst-Beobachtungen in der Höhe bestätigen dies. Die Ursache liegt zum Teil darin, dass in verdünnter Luft die Darmgase einen grösseren Raum einnehmen und dadurch das Herabsteigen des Zwerchfelles ein wenig erschweren.

Ich möchte an dieser Stelle die in den Lungenheilstätten in neuerer Zeit fast allgemein geübte Methode, die Patienten dauernd liegen zu lassen, Ihrer Kritik empfehlen. Gewiss wird es bei akuten Reizzuständen nötig sein, das kranke Organ so ruhig als möglich zu halten. Das ist bei der Lunge selbstverständlich nur möglich, wenn der Gesamtkörper ruht, denn jede Muskeltätigkeit erfordert verstärkte Atembewegungen. Wenn es aber wahr ist, dass die mangelhafte Beweglichkeit der oberen Brustpartie die Ursache dafür ist, dass die Tuberkulose sich am häufigsten in den Lungen-

spitzen lokalisiert, liegt doch ein Widerspruch darin, dass man die Bewegung dieser Spitzen durch Ruhelage des Körpers wochen- und monatelang noch mehr einschränkt. Wie verträgt sich diese ins Extrem getriebene Liegekur mit den in neuerer Zeit gemachten Vorschlägen, die Beweglichkeit der oberen Thoraxpartien bei Phthisikern auf operativem Wege zu erhöhen? Es kommt hinzu, dass bei dauerndem Liegen jede Anregung für die Herztätigkeit wegfällt und dadurch dieses Organ in seiner Leistungsfähigkeit stark herabgesetzt wird. Wenden wir doch sogar bei direkter Erkrankung des Herzens Gymnastik und sogar leichtes Bergsteigen an, um durch gelegentliche stärkere Arbeit das Organ zu kräftigeren Leistungen zu erziehen. Ich glaube, die moderne Liegekur ist nur eine Reaktion gegen die allzustarke Bewegung und die allzukräftigen Reize, welche von den Therapeuten der Höhenkurorte in der ersten Zeit angewendet wurden. Damals machten in Davos ernstlich kranke Phthisiker Bergbesteigungen von 1000 M.; sie wurden mit eiskalten Duschen behandelt und liefen nach diesen Duschen gehörige Wegstrecken in der Winterkälte, um sich wieder zu erwärmen. Zwischen diesem Extrem und der modernen Liegekur dürfte wohl die heilsame Mitte zu suchen sein.

Ein weiterer wichtiger Gesichtspunkt bei der Höhenkur ist die im Höhenklima viel leichter als in der Ebene mögliche Abhärtung des Menschen, d. h. seine Gewöhnung an das Ertragen von Temperaturwechseln, die so häufig den ersten Anlass zu Katarrhen und damit zur Ansiedlung tuberkulöser Infektion geben. Es ist wohl in erster Linie die rasche Verdunstung in der verdünnten Luft, welche es zu einer Schweissansammlung nicht kommen lässt, als Ursache des leichteren Ertragens von Wetterwechsel im Hochgebirge anzusehen. Die grösste Gefahr der Schädigung auf dem Wege der sogenannten Erkältung liegt wohl in der Durchnässung der Haut und der Kleider mit Schweiss, welche wir in feuchtwarmem Klima nach jeder Anstrengung erleiden und welcher der Phthisiker mit seiner zum Schwitzen geneigten Haut besonders ausgesetzt ist. In der Höhe kommt es in Folge der erleichterten Verdunstung nicht leicht zu übermässiger Ansammlung von Schweiss in den Kleidern, und die bessere Abkühlung der Haut durch Verdunstung sowohl wie durch Luftbewegung schränkt die Sekretionstätigkeit der Schweissdrüsen erheblich ein. Infolge dieses Umstandes stellt sich schon nach kurzem Aufenthalt im Hochgebirge eine ganz überraschende Wetterfestigkeit bei fast allen Menschen ein.

Da alle vorstehend angedeuteten Wirkungen des Höhenklimas sich in der gemässigten Zone schon bei etwa 600 M. Höhe bemerkbar machen und bis zur Höhe von 2000 M. stetig zunehmen, wird der Arzt sich von der Erregbarkeit des Nervensystems des Patienten bestimmen lassen bei Auswahl der zu verordnenden Höhen.

HIGH-ALTITUDE TREATMENT OF PHTHISIS, WITH SPECIAL REGARD TO FEBRILE CONDITIONS.

By O. Amrein, M.D.,
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Although the influence of the climate at high altitudes on tuberculosis has long been known and estimated, and although the results obtained at the mountain stations have been appreciated as most excellent, there are many medical men who refuse to acknowledge the good of climates at all, and especially of climatic conditions at high altitudes. Often, indeed, we may hear the opinion expressed that tuberculosis must be cured under the same climate conditions as those under which patients have been living or under which they will have to live afterward. And many of the lowland sanatoriums declare that they obtain just as good results as those obtained at high altitudes. So long ago as 1901, before the British Congress on Tuberculosis in London, I expressed my opinion about the influence of the mountain air, and now, as then, I have no wish to raise any question of the great importance of the sanatorium treatment in the lowlands and the great work they are doing in combating systematically and with all the resources of modern therapeutics this awful disease. But tuberculosis is such an obstinate and horrible chronic complaint that the very best weapons can only be good enough to fight with against it, and any factor which helps us in this fight must be accepted with enthusiasm. Undoubtedly proper care is the most important element in the treatment of tuberculous patients, and proper care in a bad climate is much better than no care in a good one. Nevertheless no one will venture to deny that the very best of all is: *proper care in the best possible climate.*

If workmen get ill by continually poisoning themselves through working in a poisoned atmosphere, we remove them from their unhealthy conditions, *e. g.*, painters poisoned with lead, arsenic colors, etc. A confirmed cigarette-smoker is advised by us to give up his smoking; that is, to leave his atmosphere of nicotine. Asthmatic patients who suffer badly at a certain place are removed to a more suitable locality. And so I think it best for tuberculous patients also to leave the "milieu" where they became ill, and our experience does show us that precisely this change from the home climate where people got ill to high altitudes gives a new impetus to the organism which enables it to fight and conquer the disease.

I am far from appraising the high-altitude treatment as a panacea, as an infallible remedy, but after having been cured of tuberculosis myself in the Swiss mountains, and after an experience of nearly ten years' practice there, I do esteem it one of the best weapons we can use, in combination with modern therapeutic methods, against this, our worst enemy.

I do not need to describe in detail again the properties of the high-altitude climate; you know them all—the low barometric pressure, the dry and pure air, the abundance of sunshine and its greater actinic power: the great number of bright and clear days even, and especially in winter, at the time when there is scarcely any sun, but generally mist and fog, down in the lowlands.* But it is just these climatic qualities which enable us to carry out the open-air treatment in a most unusual and thorough fashion. Moreover, these climatic circumstances have direct physiological effects upon the human body, and especially upon the tuberculously affected organism, so that, apart from the amelioration of the blood and the increased vitality of the bodily functions as a whole, we can see a distinct and direct influence upon many pathognomonic symptoms.

In the first place, it is astonishing how quickly cough and expectoration get better under the high-altitude climate. If there is no advanced disease of the upper air-passages (such as ulceration of the larynx or hypersensibility of the mucous membrane of the upper air-ways, both of which are contra-indications of the high-altitude treatment), the awful and bothering cough quickly gets much better. The purity of the air, with its freedom from germs, smoke, and dust, and its dryness put an end to the perpetual and continuous irritation from which the air-passages had to suffer before; and bronchial complications are affected in the same way, so that expectoration is rapidly diminished. Wonderful also is the effect upon the weakening and disagreeable night-sweats. They disappear after the very first days. During all the years I have been attending patients at Arosa I have not had to order a single medical prescription against night-perspiration; it stops without any remedy merely by the effect of the dry air and the low barometric pressure. How well I remember all the prescriptions of camphoric

TABLE I.

January, 1908.	Arosa.	Zürich.
Amount of sunshine, in hours	140.0	38.8
Amount of absolutely bright days	18.0	1.0
Average of temperature	3.0° (!) C.	3.1° C.
Maximal temperature	6.2° C.	8.8° C.
Minimal temperature	17.8° C.	12.4° C.

* Vide Table I, showing some meteorological data at Arosa for January, 1908.

acid, etc., I had to order when I was a doctor at a lowland sanatorium. Sleep, therefore,—so important for our patients,—at once becomes better, deeper, and more uninterrupted.

A tendency to hemorrhages is often said to be a contraindication for the high-altitude treatment. Many communications and statistics (such as those published by Turban, Egger, and myself, Transactions of the British Congress, 1901) have shown that hemorrhages are not more frequent, but, on the contrary, are less frequent at high altitudes than in the lowlands. There is one exception, however, in which I have found a mountain climate contraindicated in this respect. It is when blood-spitting is due to an increased blood-pressure. Such cases do not do well in our altitude, as sudden changes in the pressure of the air, "Föhn-Wind," etc., make such cases worse and provoke hemorrhages. I send such patients away, even if the blood-spitting has not been more than a hemoptysis. In fact, protracted and obstinate hemoptysis is often characteristic of just such cases as are not likely to benefit by high-altitude treatment.

One of the most important symptoms and a cause of much anxiety and therapeutic effort is the fever of tuberculosis. It is said that fever does contraindicate the high-altitude treatment, but all physicians who have attended tuberculous patients at high altitudes have stated the contrary, and they very often see the fever which has already persisted a long time at a lower elevation lessen and disappear. (Statistics published by Turban, Philippi, and others demonstrate this.) Opponents of the high-altitude treatment deny it, but they show us no proof that they rid more patients of fever in the lowlands than we do up in the mountains.

It is always very difficult to compare the statistics of different authors if the material of their statistics is not absolutely the same, but still they give us some idea on this matter.

I should like to point out a few details with regard to fever patients from my own experience. First, I must say that I call a patient free of fever only if—for at least two weeks—his temperature taken in the mouth for ten minutes at intervals of two hours never goes higher than 37.2° C. (99.0° F.), and if the remissions in the early morning and late in the evening at least go down to 36.6° C. (90.0° F.). I keep patients with higher temperatures than 37.3° C. in bed from the beginning, and let them get up on the balcony only after they have not overpassed 37.2° for at least five days, and I let them begin to walk only after another five to eight days with unaltered temperature.

Much depends upon the kind of fever, whether it will yield to treatment or not. It is to be understood that hectic fever, due to destructive process in the lungs and a progressive loss of vitality, will not be influenced. It makes a difference also whether the fever has already persisted for a long

time or not, and whether it constantly persists or comes in irregular or cyclic outbursts (precisely this kind of fever is often a bad prognostic), or whether it is high or low. But a most important criterion is always the pulse. A quick pulse of 100 or more, with a somewhat low fever (37.6° to 37.9°), and remaining quick even with perfect rest, gives less chance of getting rid of the fever than higher fever with a good and steady pulse. This also is more or less independent of the stage of tuberculosis. Patients in later stages with a good pulse have generally a much better prognosis than patients in earlier stages with the same height of fever but a less favorable pulse.

Though the extent of the progress of disease in the lungs be necessary for us to classify our patients, the temperature and the pulse alone enable us to judge of the activity of the process.

The following figures illustrate in greater detail some of the above statements. My material is, of course, different from that of some sanatoriums, as two-thirds of my patients belong to the first stage (Turban).

Of 1050 patients, 183, or 17.3 per cent., came under my treatment with fever.

From these patients the following results were obtained:

I. Stage; of	60	fever patients	.....	57	=	95.0%	lost their fever	
II. Stage; of	94	"	"	.....	78	=	82.9%	" " "
III. Stage; of	29	"	"	.....	15	=	51.7%	" " "
Altogether, of	183	"	"	.....	150	=	81.9%	" " "

If we call fever up to 38.5° C. low fever, and fever above 38.5° C. high fever (after Turban), my fever-figures are as follows:

I.	of 51	I low-fever	patients	.....	51	=	100.0%	lost their fever
	of 9	I high-fever	"	.....	6	=	66.6%	" " "
II.	of 47	II low-fever	"	.....	41	=	87.2%	" " "
	of 47	II high-fever	"	.....	37	=	78.7%	" " "
III.	of 4	III low-fever	"	.....	3	=	75.0%	" " "
	of 25	III high-fever	"	.....	12	=	48.0%	" " "

Thus, in relation to the degree of fever the figures are different. It is to be added that among the three patients in class I high fever who did not lose their fever, there was one case with salpingitis tuberculosa, and one patient who developed miliary tuberculosis and meningitis. The diagnosis of both was justified post mortem.

Among the six patients of class II low fever who did not become afebrile one had tubercular ulceration on the larynx and died from it. Among the ten patients of class II high fever who did not become afebrile were four with tuberculosis intestinalis and one with syphilitic ulceration on the

larynx, who died from the syphilis. Among the thirteen patients of class III high fever who did not lose their fever were one who arrived in Arosa moribund, and died six hours after his arrival, five with laryngitis tuberculosa, and one with otitis media.

Complications render the prognosis much worse everywhere, and not only at high altitudes, but the latter have a specially bad influence on advanced laryngeal affection with destructive processes.

It may be of interest to know also the state of the pulse in the above cases. With Philippi, I call Pulse I a pulse below 100; Pulse II, a pulse from 100 to 120; Pulse III, a pulse over 120.

Of the 57 patients of Stage I who became free of fever, 56 had Pulse I and 1 had Pulse II (tachycardia nervosa). Of the 78 patients of Stage II who became free of fever 69 had Pulse I, 9 had Pulse II. Of the 15 patients of Stage III who became free of fever 8 had Pulse I, 7 had Pulse II.

If we now compare the fact that of the 16 patients of Stage II who did not lose their fever 11 had Pulse II and 5 had Pulse III; and that of the 14 patients of Stage III who did not lose their fever 5 had Pulse II and 9 had Pulse III, we see what a valuable indication the pulse gives us in our prognosis.

It may be added here that in three cases with Pulse I and in five cases with Pulse II I found a pulsus intermittens irregularis. In all eight cases there was no fever or only low fever. It would be interesting to know whether this is a direct effect of the tuberculo-toxins upon the heart's function.

The shortest time in which a patient lost his fever was three days (I low fever); the longest was fourteen and one-half months (III high fever).

I must point out that all these figures are obtained in open treatment, *i. e.*, not in a sanatorium, but in sanatorium-like hotels in Arosa, where patients are treated with all the strict principles adopted by the sanatoriums of to-day. They show indubitably that the high altitudes have a very great influence upon the tuberculous fever.

According to my experience, cases even with fever may be sent to the high-altitude stations if they have not a Pulse III. Such cases as have temperatures over 38.5° C. do not do well there. Their whole organization, especially the heart, has not enough strength and resistance, while other cases in all stages, if they have a pulse not higher than Pulse II and no hectic fever, often lose and recover in a most astonishing way. Whenever possible, patients should not be sent to our altitudes so long as they have temperatures of 39.0° C. and more; such patients had better wait until their temperatures are lower.

It is often said that tuberculous patients should be cured under the climate conditions under which they have to live afterward. But if our

patients are really cured in our mountain climate, they can live quite well in the lowlands again, assuming always that they do not leave too early and begin to work too soon. But this must be demanded of them everywhere, and if they fulfil the conditions, patients who are cured in high altitudes have still the advantage of not being relaxed, like those who pass the winter in southern climates.

There are patients, however, who are obliged to remain and live in the mountains, patients who come to us there very ill, who never get cured, but who become stationary because of the conserving effect of our climate. Such patients are able to work in the mountains, while they would lose ground down in the lowlands. I know a good many such patients, living in Arosa, Davos, St. Moritz, etc., as shop-people, or occupied in the hotels, who, although they never become quite well, keep in a relatively good state of health and are able to work. If they try to go down and live in the lowlands, they become worse; a cold or a bronchitis makes them very ill there, while they remain useful working members of society so long as they live in high altitudes.

During the last few years the "sun-cures" have begun to be known, and it is to be expected that a systematic and careful use of the sun-rays will help us in the case of a great many different diseases. Tuberculosis, especially surgical cases, has been treated with sun-rays already with excellent results, and here again the high-mountain climate enables us to carry out "sunlight cures" much more effectively than anywhere else. And not only surgical tuberculosis may be healed by sunlight with good effects, but also laryngeal tuberculosis is benefited by it, often in a remarkable way. I have taught many of my patients to use the small laryngeal mirror themselves, and they let the sun-rays enter their larynx systematically. The results are very good. And even certain cases of tuberculosis of the lungs may benefit in some degree by the use of sun-baths, that is, by the exposure of the chest and back for ten to twenty minutes, but always with the utmost care. It is, of course, in all cases necessary to individualize and to exclude patients with a tendency to hemorrhages or who are generally weak.

The specific treatment of tuberculosis with tuberculin, serum, etc., has also been employed more and more at the high-altitude stations, and it has been said that this shows that we cannot obtain satisfactory results by means of the climate alone, but must help ourselves in this way. As I said at the beginning of my paper, however, we must be glad of every help we can get in the fight against tuberculosis. Careful tuberculin treatment shows most excellent results everywhere, but all the more if combined with the high-altitude treatment. Many tuberculous patients lose their fever, improve, and reach a certain state of recovery—in itself a most satisfying result; but they then remain stationary, and especially in such cases tuber-

culin treatment often enables us to complete the healing process, and it is quite evident that where the best conditions, such as the high-altitude treatment undoubtedly offers, prevail, the specific treatment can be carried out with all the more certain effect.

Tratamiento de la Tisis por Grandes Alturas, con Especial Cuidado de las Condiciones Febriles.—(AMREIN.)

Cualquier factor que nos ayude en la lucha contra la tuberculosis debe aceptarse con entusiasmo. Do mejor para el pueblo enfermo es siempre el propio cuidado en el mejor de los climas posible. Las propiedades de los climas de las grandes alturas son: baja presión barométrica, aire seco y puro, abundancia de luz solar y de su gran poder actínico, gran número de días brillantes y claros, aun en invierno. Estas propriedades producen los siguientes efectos: mejoramiento de la sangre, aumento vital de las funciones corporales, disminución de la toz ye de la expectoración, desaparición de los sudores nocturnos, etc. La tendencia á Hemorragia no es contraindicación, excepto cuando es debida á un aumento de presión en la sangre. Tampoco es la fiebre contraindicación.

Table que presentan las resultados obtenidos con pacientes con fiebre:

Periodo	I.	de 51	pacientes	con	fiebre	f*51=100 %	perderon	la	fiebre	en	Arosa.
		de 9	"	"	"	F† 6=66.6%	"	"	"	"	"
	II.	de 47	"	"	"	f41=87.2%	"	"	"	"	"
		de 47	"	"	"	F37=78.7%	"	"	"	"	"
	III.	de 4	"	"	"	f3 =75 %	"	"	"	"	"
		de 25	"	"	"	F12=48 %	"	"	"	"	"

Los pacientes con fiebre que tienen un pulso de 120 ó más, no les va bien en las grandes alturas, mientras que los pacientes con fiebre alto pero con pulso menos de 120 á menudo les son beneficiosas. Muchos, muy malos casos, se hacen estacionaris por el efecto conservativo de nuestro clima, se conservan en buena salud y son hábiles para el trabajo. Durante los últimos años las curas de sol, han entrado en favor contra la tuberculosis laringea, etc., y esta puede llevarse á efecto con mayor eficacia en las montañas mejor que en ninguna otra parte. Tambien el tratamiento especifico (tuberculina, serum) puede aplicarse con resultado más cierto.

* f, fiebre hasta 38.5° C.
† F, fiebre arriba de 38.5° C.

DIET IN TUBERCULOSIS.

By Prof. Irving Fisher,
New Haven, Conn.

The object of this paper is to summarize and bring down to date an article* which I read at the second annual meeting of the National Association for the Study and Prevention of Tuberculosis in Washington, 1906.

In the two and one-half years which have elapsed since that time the trend of physiological discussion has tended to confirm the conclusions then tentatively reached, and later information received from sanatoriums shows that, so far as there is any tendency to agreement in dietary methods, it is in the direction toward the method then suggested.

It is still true that diet in most consumptive sanatoriums is unsystematic and extremely varying. A few still use alcohol; there is conflict of opinion as regards meat, eggs, milk, and even vegetables, fruit, and nuts.

There is still no fixed theory in regard to nutrition in tuberculosis. Some authorities maintain that a specific diet is needed, as, for instance, blood-serum from meat or mineral salts in vegetables; others, that merely a general nutritious diet should be given. There is disagreement as to the extent to which the appetite of the consumptive can be trusted or should be forced, and as to the number of calories and the proportion of proteid, fat, and carbohydrate which he should consume. It has not been definitely shown whether the aversion to fat which is alleged often to precede consumption is due to a deficiency of gastric juice, so that the consumptive instinctively avoids fat, which restrains such secretion, or whether consumption is itself largely due to the omission of fat as a nutritive element from the diet.

The data which have been obtained have come from 95 of the leading sanatoriums of the world, of which 63 were in the United States, 2 in Canada, 13 in Germany, 11 in Great Britain, and the remainder in France, Austria, Norway, Switzerland, and Russia. The following three tables give the data, the first two being general and the third specific.

The first comment which naturally occurs to the reader of these tables is that in most cases the foods employed are simply those in common use in

* "Statistics of Diet in Sanatoria for Consumptives," printed in the Transactions of the Second Annual Meeting, Washington, D. C., May 16, 1906, and also in American Journal of the Medical Sciences, October, 1906.

TABLE I.—UNMEASURED DIET (AMERICAN). (ARRANGED IN ALPHABETICAL ORDER OF LOCATION).

Institution.	Location	Physician in Charge.	Food.	Meals.*	Remarks.
Maryland St. Hosp.	Baltimore.	Louis Hamman.	Ordinary.	3(+2)	"As liberal supply as they can manage."
Montefiore Home	Bedford Sta., N. Y.	L. Rosenberg.			Moderate force-feeding.
Boulder Sanit.	Boulder, Col.	W. H. Riley (formerly). (No longer takes tbc. cases.)	Meat seldom.		High proteid. Moderate calories. Meat only when other proteid not relished. Usually those who tired of other proteid also tired of meat.
Kings Co. Hosp.	Brooklyn, N. Y.	J. F. Fitzgerald.	Ordinary.		Some force-feeding.
Brooklyn Home for Cons.	Brooklyn, N. Y.	E. Reynolds.			All stages. Uses oils combined with corn syrup, gets more wgt. gaining than when uncombined.
Nordrach Ranch	Colorado Springs.	Jno. E. White.	Milk the staple.		Force-feeding. One man took 29 glasses of milk a day.
Pembroke San.	Concord, N. H.	H. T. Fontaine.			Force-feeding.
Nat. Jewish Hosp.	Denver, Col.	M. Collins.	Ordinary (much fat).		Reaction against force-feeding causes stomach trouble. Individualizes.
Y. M. C. A. Health Farm	Denver, Col.	Jno. Wethered.			Opposed to force-feeding.
Hôtel Dieu (Sisters' Hosp.)	El Paso, Tex.	Outside physicians.	Ordinary.		
U. S. Gen. Hosp.	Ft. Bayard, N. M.	Geo. Bushnell.	Ordinary.		Amount consumed limited only by capacity and desire.
Sanit. Gabriels	Gabriels, N. Y.	W. H. Clancy.	Ordinary.	3(+3)	Force-feeding.
Muskoka Cottage San.	Gravenhurst, Ont.	J. H. Elliott.			"We constantly see cases of tuberculosis in which there is a steady gain in weight from week to week, though a very small amount of food is taken."
Muskoka Free Hosp.	Gravenhurst, Ont.	E. D. Parfit.	Ordinary.	3(+2)	
State Hosp.	Howard, R. I.	F. B. Jewett.	Ordinary.		Moderate force-feeding.
Stony Wold San.	Lake Kushaqua, N. Y.	H. S. Goodell.			Mixed diet; preponderance of proteid and fat.
Loomis Sanit.	Liberty, N. Y.	Dr. King.	Ordinary.	3(+3)	Considerable fruit. Few nuts.
Pottenger San.	Monrovia, Cal.	F. M. Pottenger.			Reaction against force-feeding.
South Mt. Camp. San.	Mount Alto, Pa.	A. M. Rothrock.			No restraint on amount of food. Believes, however, in limiting proteid.

TABLE I.—UNMEASURED DIET (AMERICAN). (ARRANGED IN ALPHABETICAL ORDER OF LOCATION.)—(*Continued.*)

INSTITUTION.	LOCATION.	PHYSICIAN IN CHARGE.	FOOD.	MEALS.*	REMARKS.
Riverside San.....	N. Y. City.	H. S. Westmoreland.	Ordinary.	3	Unlimited use of eggs.
Seton Hosp.....	N. Y. City.	E. C. Garlock.	Uses beer.	3	
St. Joseph's Hosp.....	N. Y. City.	C. M. Cauldwell.		3(+2 or 3)	Includes cod-liver oil and Maltzyme.
Grand View Inst. for Cons.	Oil City, Pa.	H. E. Kirshner.		3	Average diet consists of 6 to 8 raw eggs, 2 qts. milk, and full meal at dinner time. Patients often gain better upon three meals than when the two lunches are added. Also some gain better taking 6 eggs than when they have been given as high as 16 in a day.
Ottawa Tent Colony ...	Ottawa, Ill.	J. W. Pettit.	Ordinary + nuts.	3(+3)	Applies domestic science and balanced bills of fare.
R. I. State San.....	Pascoag, R. I.	H. L. Barnes.	Ordinary.	3	
Phila. Gen. Hosp.....	Philadelphia.	Wm. B. Stanton.			Much liquid; 3 qts. milk, 6 raw eggs, and 1 full meat meal daily.
N. Y. State Hosp.....	Ray Brook.	Burnham.			Force-feeding.
Mass. State Sanit.....	Rutland, Mass.	W. J. Marclay.	Ordinary.	3(+3)	Reaction against force-feeding.
West Mt. San.....	Scranton, Pa.	J. M. Wainwright.			Force-feeding.
Sharon Sanit.....	Sharon, Mass.	W. S. Griffin.			Moderate force-feeding.
New Mexico Cottage San.....	Silver City, N. M.	E. S. Bullock.		3	Least to gain weight, ideal is 20 lbs. above normal, av. gain 30 lbs. High nitrogen. Reaction against overfeeding, individualizes.
Mt. St. Rose San.....	St. Louis, Mo.	Wm. Porter.	Ordinary.		Individualizes.
Washington Asylum...	Washington, D. C.	L. F. Zinkhan.		3	Much fat.
Sunnyrest San.....	White Haven, Pa.	E. Stockdale.	Ordinary + fruit and nuts.	1(+5)	Large gains in weight. Finds that any one can take milk and eggs granting they are the right quality.

* The numbers in parentheses are extra lunches additional to regular meals. These extra lunches usually consist of milk and eggs.

TABLE II.—UNMEASURED DIET (FOREIGN). (ARRANGED IN ALPHABETICAL ORDER OF LOCATION.)

Institution.	Location.	Physician in Charge.	Food.	Meals.*	Remarks.
Tonsaasen.....	Christiania, Nor.	Andvord.			Against force-feeding. Patients should "reduce outgo instead of increase income," *i. e.*, rest instead of overfeed.
Turban's San.....	Davos-Platz, Switz.	S. Turban.			Force-feeding.
San. Brehmer.....	Goerbersdorf, Ger.	Von Hahn.		5	
Institut für Pharmakol. und physiol. Chem.....	Rostock, Ger.	R. Kobert.			Force-feeding. Proteids and fats.
Römpler's San.....	Goerbersdorf, Ger.	Th. Römpler.			No restriction in diet.
San. Grand Hotel	Leysin, Switz.	Echaquet.			Seen many digestions ruined by overfeeding, yet patients without appetite should be urged.
Mt. Vernon Hosp.....	London.	T. N. Kelynack.			Individualizes.
Nordrach Colonie	Nordrach, Ger.	Otto Walther.			Minimum diet for wt. gaining. Individualizes. Some hardly any meat, others much. "Av. $\frac{1}{5}$ meat and albuminous, $\frac{1}{5}$ fat, $\frac{3}{5}$ farinaceous, ordinary diet about 15 per cent. proteid, 35 per cent. fat."
Kremser San.....	Sulzhayn.	Kremser.	Ordinary.	3(+2)	"I absolutely disagree with the general superalimentation practised in many sanatoriums —my experience proves that an overfeeding has not the least favorable effect in weight gaining, but that the chief point is to keep the proper balance in the composition of the diet, *i. e.*, proteids, fat, and carbohydrates, like 1 : 3 resp. 1 : $4\frac{1}{2}$.
	St. Petersburg, Russia.	Simon de Unterberger.			Much meat; opposed to diet regulation.

* The numbers in parentheses are extra lunches additional to regular meals. These extra lunches usually consist of milk and eggs.

TABLE III.—MEASURED DIET. (IN ORDER OF QUANTITY OF FOOD USED.)

Institution.	Location.	Physician in Charge.	Foods.	Number of Meals.	Proteid.	Fat.	Carbohydrate.	Total Calories.	Remarks.
Roten Kreuz San..	Grabowsee, Ger.	Werner.			1200	2200	2100	5500	
Maine San.....	Hebron, Me.	Estes Nichols.	Ordinary.		840	1900	1640	4380 at first	Does not include extra eggs and milk.
					500	1200	1600	3300 later	
Post Graduate Annex	N. Y. City.	John F. Russell. For rest treatment only milk, bread, butter, emulsion, and vegetable juice. In all cases excludes alcohol, tobacco, tea, coffee, chocolate, cocoa, beef-tea, meat extracts, meat juice, and vinegar.			510	2165	1565	4240	Average diet under rest treatment. Uses glycerin, calcium chlorid, and cathartics systematically; ambulant cases use more food. In selected cases omits meats.
Rekneas San.....	Christiania, Norway.	Edw. Kaurin.			820	1860	1470	4150	
Royal Nat. Hosp. for Cons.....	Ventnor, Isle of Wight.		Ordinary.		700	1660	1640	4000	Average diet.
Agnes Memorial San.....	Denver, Col.	G. W. Holden.	Ordinary.	3	830	1665	1470	3965	Greater gains of weight on 3 than on 5 meals.
Reception Hosp...	Saranac Lake, New York.	E. R. Baldwin.	Ordinary.	3+(2)	650	2000	1250	3900	
Millet San.....	East Bridgewater, Mass.	C. S. Millet.	Ordinary.	3	600	1500	1450	3550	Average four days one patient.

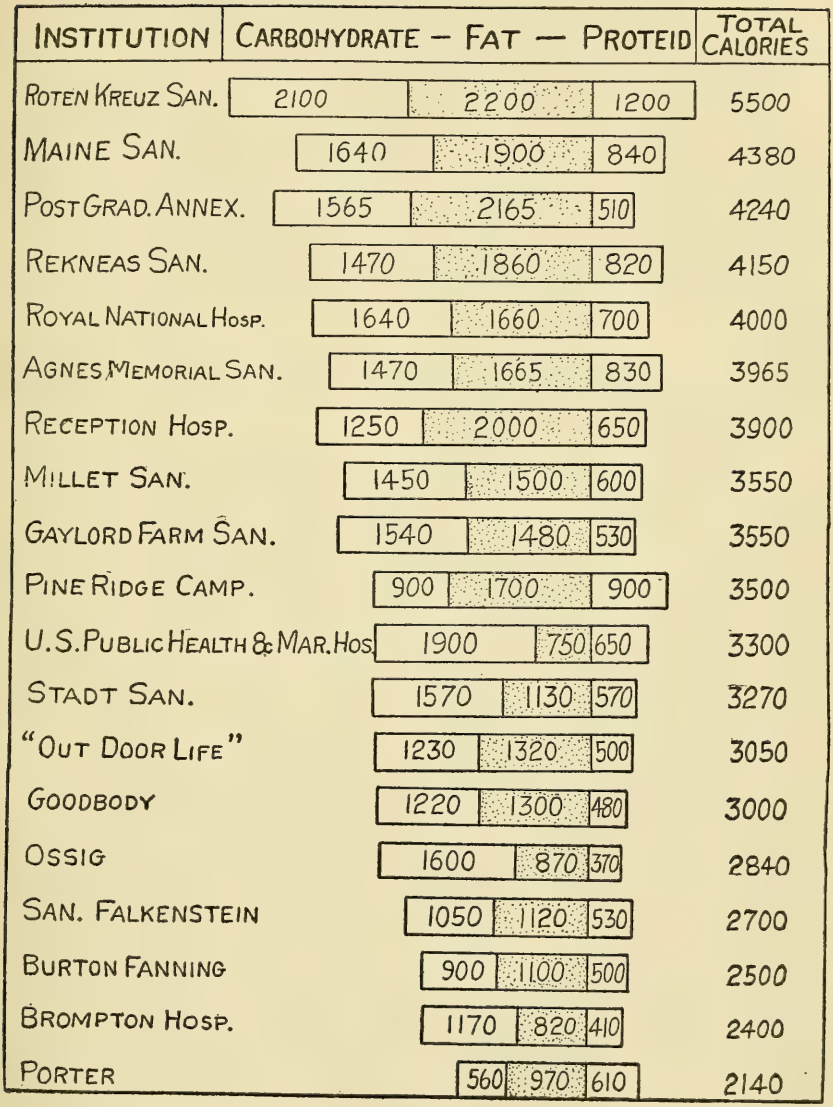
TABLE III.—MEASURED DIET. (IN ORDER OF QUANTITY OF FOOD USED.)—(*Continued.*)

INSTITUTION.	LOCATION.	PHYSICIAN IN CHARGE.	FOODS.	NUMBER OF MEALS.	PROTEID.	FAT.	CARBOHYDRATE.	TOTAL CALORIES.	REMARKS.
Gaylord Farm San.	Wallingford, Conn.	D. R. Lyman.		3	530	1480	1540	3550	No force-feeding except in special cases. Most are restrained from overeating. Average gain in weight of the 10 discharged cases whose average diet was given was 19 lbs. in from three to six months, varying from 13 to 22, proteid from 340 to 630, fat from 1100 to 2000, and the calories of the ten varied from 2700 to 4100. Those 10 cases were heavier eaters than the average. They had 3 meals and one or two glasses of milk between meals. No extra eggs. Seven were males, 3 females, 5 were at or above their normal weight when discharged (by insurance tables), 5 below.
Pine Ridge Camp..	Providence, R. I.	W. H. Peters.	Ordinary.		900	1700	900	3500	Fairly early weight gaining cases.
U. S. Pub. Health and Marine Hos. Ser.....	Ft. Stanton, N. M.	P. M. Carrington.			650	750	1900	3300	Based on standard diet of U. S. Health & M. H. Ser. with addition of milk and eggs.
Stadt. San.....	Munich.	Filler.			570	1130	1570	3270	If necessary.
			Ordinary.		500	1320	1230	3050	"Jour. of Outdoor Life," Jan., '06.
		Goodbody, Bardswell & Chapman.			480	1300	1220	3000	Most suitable diet for tuberculosis. Med. Chir. Trans., vol. 84, 1902, pp. 119, 120.
					370	870	1600	2840	Proposed in "Good Health," 1905, by Dr. Herbert Ossig.

TABLE III.—MEASURED DIET. (IN ORDER OF QUANTITY OF FOOD USED.)—(*Continued.*)

INSTITUTION.	LOCATION.	PHYSICIAN IN CHARGE.	FOODS.	NUMBER OF MEALS.	PROTEID.	FAT.	CARBOHYDRATE.	TOTAL CALORIES.	REMARKS.
San. Falkenstein.	Falkenstein, Ger.	Besold.	Nuts, fruit and grains, exclusively.		530	1120	1050	2700* 3400† 2000‡	Opinions on superalimentation agree with Dettweiler, his predecessor. Chief aim should not be to make patient as fat as possible, and "one never can expect a patient to be the more resistant to disease the fatter he is or becomes." Superalimentation only needed to compensate the loss of proteids and fats; especially needed in feverish cases. In later cases much fat given. In other cases individualizes the diet by weighing the patient.
Winyah San.....	Asheville, N. C.	Van Ruck.	Ordinary.					2500	Digestive complications determined by laboratory examinations. For weight gaining fats and carbohydrates predominate.
		Burton-Fanning.	Ordinary, few vegetables.	3+(3)	50 0	1100	900	2500	See "Open-Air Treatment of Tuberculosis."
Brompton Hos. for Cons.....	London.	Williams.	Ordinary.		41	820	1170	2400	Average diet.
	New York.	W. H. Porter.	Excludes potatoes, cereals, fruit, nuts, pastry, most vegetables, soups.		610 0	970	560	2140	"American Medicine," September 20, 1902.

* Average. † Maximum. ‡ Minimum.


INSTITUTION
CARBOHYDRATE — FAT — PROTEID
TOTAL CALORIES
ROTEN KREUZ SAN. 2100 2200 1200 5500
MAINE SAN. 1640 1900 840 4380
POST GRAD. ANNEX. 1565 2165 510 4240
REKNEAS SAN. 1470 1860 820 4150
ROYAL NATIONAL HOSP. 1640 1660 700 4000
AGNES MEMORIAL SAN. 1470 1665 830 3965
RECEPTION HOSP. 1250 2000 650 3900
MILLET SAN. 1450 1500 600 3550
GAYLORD FARM SAN. 1540 1480 530 3550
PINE RIDGE CAMP. 900 1700 900 3500
U.S. PUBLIC HEALTH & MAR. HOS 1900 750 650 3300
STADT SAN. 1570 1130 570 3270
"OUT DOOR LIFE" 1230 1320 500 3050
GOODBODY 1220 1300 480 3000
OSSIG 1600 870 370 2840
SAN. FALKENSTEIN 1050 1120 530 2700
BURTON FANNING 900 1100 500 2500
BROMPTON HOSP. 1170 820 410 2400
PORTER 560 970 610 2140

the locality where the sanatorium happens to be situated. Almost any article of food, however deleterious in the estimation of the physiologists, can be found in the lists supplied; such, for instance, as wine, beer, vinegar, pickles, catsup, fried food, pork, sausage, tripe, tea, coffee, pastry, etc.

Two sanatoriums, one American and one German, replied that they could not regulate their patients' diet because their patients were able to pay well and expected to get what they wanted to eat!

On the other hand, some of the sanatoriums have taken particular pains to exclude foods regarded by the management as deleterious, or to make extensive use of foods regarded as especially beneficial. Thus a few have made special use of nuts and fruit; others of cod-liver oil emulsions, peptol, corn syrup, malted nuts, maltzyme, vegetable juice, etc.

At the Mundesley Cottage Sanatorium no patient is allowed to take alcohol in any form during his stay at the cottage, under the penalty of dismissal.*

Although replies were not received from all institutions, the impression received is that most of them exclude alcohol, and some exclude tobacco, tea, coffee, beef-tea, meat extracts.

From the third table two notable facts stand out: First, the variability in the number of calories consumed; and, second, the variability and excessive quantity of the proteid. The calories vary from 2100 to 5500, a range of 160 per cent. It is quite possible that the extremely low value, 2100 calories, is due to some error in computation, although this number of calories is sufficient, according to the measurements of Prof. Benedict in his respiration calorimeter, to maintain an average person in nutritive equilibrium provided he takes no exercise. For an ordinary person living a sedentary life the measurements of Prof. Benedict would seem to indicate that about 2700 calories are required. There can be little doubt that 5500 calories, which represents forced feeding, is far in excess of any needs of the body. Such a diet for a consumptive who is necessarily exercising but little must either result in an excessively rapid gain in weight, or very imperfect assimilation, and in either case there must be a strain on body economy.

That such excessive diets are not necessary for satisfactory gains in weight is evident from the experience of the Gaylord Farm Sanatorium, in which the patients were allowed to follow their own appetites. There the calories consumed averaged 3550, and there was an average gain in weight of 19 pounds in from three to six months. It was found that, provided there was good cooking and the food was palatable, it was not necessary to urge patients to eat in order to have them gain weight. The effort was rather to restrain their tendency to eat owing to the fact that many of them

* "The Consumptive Working Man," by Noel Dean Bardswell, London, 1906, p. 9.

were possessed of the idea that rapid gain of weight meant a rapid gain of health.

At the Mundesley Cottage Sanatorium* Dr. Bardswell says: "When one is dealing with patients with early disease, with normal appetites, and with unimpaired digestions, as was the case in most of the patients treated at the cottage sanatorium, there is not the least trouble in this respect. The difficulty as to food at the cottage lay rather in the opposite direction, for the change from town to the bracing air of the east coast made the men's appetites so keen that they ate more than we had anticipated. The actual nutritive value of the daily diet of their own election was: proteid 196 grams, fat 126 grams, and carbohydrate 522 grams, with a caloric value of 4040. The size of this diet is well shown by comparing it with the figures of a diet calculated by Atwater to be adequate for a blacksmith doing severe muscular work, viz., proteid 176 grams, fat 71 grams, and carbohydrates 666 grams, with a caloric value of 4117. The amount of food taken at the cottage would, indeed, suggest that the patients were purposely stuffed. The fact that the food given, though simple, was of a more appetizing character than that taken by most of the men when at home probably accounts to some extent for their eating so much."

On the basis of the accompanying tables, we may feel satisfied that given proper foods and proper proportions of food elements, the average tuberculosis patient can be successfully nourished on 3000 calories per day. In other words, *on no more than is usually consumed by the ordinary sedentary man.* It would be wrong, however, to prescribe any average fixed amount for all patients, as the quantity consumed must obviously vary with the size of the patient, his activity, and the condition of his digestive apparatus. Hitherto there has evidently been too much ambition to produce large gains in weight. Weight-gaining which is purchased at the cost of strain on the physiological machinery does not mean permanent benefit. Observation with many individual patients would seem to prove that those who have added weight above the normal have a burden which is not only useless, but which inhibits the power to work. This observation is confirmed by that of the physician who stated to the writer that the patients whom he had seen discharged from a large and celebrated sanatorium were generally fat but weak. It is sometimes thought that a patient when leaving a sanatorium should carry with him some surplus weight, in the belief apparently that this surplus would stand him in good stead in case of relapse. If, however, as observation shows, this surplus weight is a constant hindrance to work, it is not improbable that relapses themselves may be made more likely by the attempt to maintain such surplus weight, with its consequent daily tax on digestion, assimilation, and elimination.

* Ibid., p. 11.

The experiments in England of Doctors Goodbody, Bardswell, and Chapman show that overfeeding even healthy individuals, while it produces gains in weight, injures their health and fitness for work. It would seem that a consumptive whose ability to cope with excessive food is less than that of the ordinary individual must be considerably handicapped when he attempts to resume active work, and attempt at the same time to maintain a body-weight above normal. His working power is not only impaired, but he runs the risk of working beyond his strength. One patient who for two years struggled in vain to resume work and maintain his acquired weight, which was 25 pounds above normal, found that after adopting the "physiological economy" of Prof. Chittenden and losing this surplus weight, he was enabled to reach and even surpass his former working capacity.

Dr. Pottenger, of San Moravia, California, states that he has for some time, especially during the last two years, been tending against forced feeding.

Quite as important as the question of quantity of food is the question of the proportion of food elements. From Table III we observe that there is a great variation in the proportions of proteids, fats, and carbohydrates employed in different sanatoriums. The proteid ranges from 370 calories to 1200 calories. The lowest of these is beyond the amount which Professor Chittenden has indicated as required for a healthy man. The normal requirement for a man weighing 140 pounds is a little over 200 calories of proteid. It is probable that a consumptive needs more proteid than a healthy man, for his disease destroys tissue and proteid repairs tissue. On the other hand, whatever proteid is used in excess of that required for repairing tissue must, it would seem, be quite as disastrous, if not more so than, for a consumptive as for an ordinary individual. These evils are, as the researches of Chittenden, Mendel, Folin, Herter, Metchnikoff, Tissier, Combe, Kellogg, Türck, and others show, first: that proteid which is not used for tissue-building is not "burned clean," as are fat and carbohydrates, which yield merely water and carbonic-acid gas, but leaves behind "clinkers" in solid form—for instance, uric acid; secondly, that meat proteids already contain such "clinkers" in their extractives, which are superadded to the similar products from the metabolism of proteid in the body; third, that all proteid which is not absorbed is subject to putrefaction in the intestinal canal, and gives rise to toxins which are partially absorbed, and produce injuries of various kinds to the organism.

While this putrefaction may be mitigated by the use of sour milk and Yogurt, and various other lactic acid preparations and ferments, such methods should be used only in conjunction with a reduction of the proteid to such amount as is considered safe. It would seem probable that this amount seldom exceeds 300 calories per day, although so far as I know no exact measurements for nitrogenous equilibrium have been made for con-

sumptive patients. The figure 300 is largely hypothetical, and is 50 per cent. more than the requirements of a healthy man, and as large as some intelligent physicians have employed recently with apparent success. Experiments have shown that slow eating has a tendency to reduce the proteid ingested, and probably the safest way of arriving at the normal intake of proteid is to urge the patient to eat slowly and to masticate thoroughly.

It is doubtful whether any effort to rigidly prescribe a diet to a consumptive could be attended with as much success as general advice checked by exact observation of the total calories and the proportions of proteid, fat, and carbohydrate. Such exact observation can now be easily made. A short method which has been put forward by the present writer is described in the American Journal of Physiology* and in the Journal of the American Medical Association.†

That there is a distinct tendency to-day toward a lowering of proteid in the treatment of tuberculosis is evident from replies which the writer has received from various physicians, and also from medical literature. The change which is going on has largely been due to the influence of Prof. Chittenden's well-known works. Dr. Huber‡ states: "The dietetic vice of a century ago was alcohol. * * * We of to-day undoubtedly eat too much, especially too much meat. * * * In eating too much, considerable energy is wasted in getting rid of unassimilable food surplus. * * * Of course, the organisms of most consumptives are half starved by the disease, and they need all the nutriment they can properly metabolize: but superalimentation is certainly a mistake, and Chittenden furnishes the reason why in urging the consumptive to eat more than his tissues can assimilate, we, instead of benefiting him, are actually adding another to the many untoward conditions with which he must contend. The consumptive should be generously fed, but it is worse than error to gorge him."

Dr. George Krall, in an article§ on the administration of proteids in tuberculosis, says: "No investigators have made the painstaking and convincing experiments that have been performed by Chittenden. His work should be a monumental guide in our treatment of this disease, tuberculosis. * * * The tendency of recent scientific observation, based upon more thorough methods, leads us to believe that the ingestion of excessive amounts of proteid in the treatment of tuberculosis is not only unjustifiable, but harmful. This opinion is held by Folin, who seems to have a keen insight

* "A New Method of Indicating Food Values," Amer. Jour. of Physiology, vol. xv, April 2, 1906.

† "A Graphic Method in Practical Dietetics," Jour. Amer. Med. Assoc., April 20, 1907, pp. 1316–1324.

‡ Monthly Cyclopedia of Practical Medicine, vol. x, p. 359, 1907.

§ See Medical Record, September 21, 1907.

into the demands of economy. His observations have been confirmed by others, who show that the organism thrives and continues in a state of nutritional equilibrium when but small quantities of proteid are administered." He goes on to state the cases of excessive use of proteid in sanatoriums, and he points out that in the sanatorium at Bridge-of-Weir the diet, which originally contained 150 grams (615 calories) of proteid, has been recently reduced somewhat.

One physician reports the following experience with reference to the effect of high and low proteid on a patient and on himself (a cured consumptive):

"Now this patient weighed about 110 pounds. Anxious to increase his weight as rapidly as possible, we repeatedly tried to raise the proteid intake, but each time it was a total failure, and the high proteid diet invariably caused intestinal putrefaction, a decided degree of rise of temperature, and a general feeling of malaise. * * * Desirous to find out whether I would be affected in the same manner as Mr. ——, I, too, raised my proteids up to 4 ounces per day (470 calories). The result was that I became completely knocked out. * * * Two years ago, and three years ago, and two and a half years ago I had the same experiences. Each time the above symptoms showed themselves the moment I ventured to raise the proteids to 4 ounces and above. The lungs, I became more and more convinced, are made diseased because they are bathed in impure blood, improperly oxidized."

Another physician, and one who has made a special study of the proteid question, reports: "I have a case to report which I think will interest you—a man who had tuberculosis of the intestines, who was very much emaciated. We found tubercular bacilli in the feces, so that there was no doubt of the diagnosis. This man has gotten well on a non-flesh dietary. * * * Nothing could be worse for intestinal tuberculosis than a flesh diet, for the feces would furnish the best possible medium for a growth of the tubercular bacilli."

Dr. Rothrock, physician in charge at the Pennsylvania State Sanatorium, writes: "We have never insisted here on pushing the milk and eggs as strongly as have some other sanatoria, but we have tried instead to be guided by the individual patient's ability to use and digest the food-stuffs given." Dr. Rothrock had expressed, two years ago, his belief in limiting the proteid ingested.

An examination of Table III will show that not only proteid but also fat and carbohydrate vary widely. In one case the fat alone amounts to 2200 calories, or as much as the total food in some institutions. In another case it is as low as 750.

While only tentative conclusions can yet be drawn as to diet in tuberculosis, we feel fairly safe in stating:

First, that forced feeding in general should be abandoned.

Second, that the proportion of nitrogenous food should be greatly reduced. Hitherto, with a few notable exceptions, sanatoriums have merely imitated the home table, but it is unscientific to follow current custom in food, and may be quite as disastrous to the patient as to follow current custom in ventilation. It is equally unscientific to follow dogmatic opinions of authorities, however eminent. No science ever made progress which centered on opinion. The only tribunal in true science is the tribunal of facts, carefully arranged and sifted.

La dieta en la Tuberculosis.—(FISHER.)

El objeto del presente es resumir y poner a la fecha un articulo leído en la segunda reunion anual de la Associación Nacional para el Estudio y Prevención de la Tuberculosis, en Washington, 1906. Se ha señalado como variable y falta de todo sistema, la dieta de la mayoría de los sanatorios para tísicos y que con pocas excepciones el alimento usado en tales establecimientos difiere poco, prácticamente, del que se usa en las casas de huéspedes y hogares vecinos. Sin embargo hay excepciones importantes. Se presentan tres cuadros estadísticos basados en datos obtenidos de 95 sanatorios principales del mundo, de los cuales 65 están en los E. E. U. U., 2 en el Canadá, 13 en Alemania, 11 en la Gran Breteña, y el resto en Francia, Austria, Noruega, Suiza y Rusia. Se nota que hay una gran variedad en el número de calorías consumidas que oscila entre 2,100 y 5.500 ó sea 160%. La variación de los elementos nitrogenados llama la atencion. Se concede que 3,000 calorías son ampliamente suficientes para suplir las necesidades diarias de un tísico, con tal que el 10% sea en la forma de proteidos. Tambien se señala que el exceso de proteides es perjudicial al tísico debido á la putrefacción intestinal que resulta y por razón de los productos de desperdicio en la oxidación de los proteines, que en el caso de la carne se añaden á los ya existentes en ésta.

Hay actualmente una tendencia marcada contra el uso excesivo de carne y proteidos en la dieta tuberculosa. El cambio es debido a las investigaciones de Chittenden, Folin, Herter, Metchnikoff y otros que han demostrado que el consumo de proteidos en la dieta de la mayoría de los pueblos occidentales es excesivo.

La diète dans la tuberculose.—(FISHER.)

Le but de cet article est de résumer et de compléter avec les données nouvelles, un ouvrage présenté à la seconde réunion annuelle del'Association nationale pour l'étude et la prophylaxie de la tuberculose, tenue à

Washington, en 1906. Dans la plupart des sanatoria pour les phtisiques, la diète n'est pas systématique et varie extrêmement; avec peu d'exception, la nourriture employée dans n'importe quel sanatorium est presque la même qu'on donne dans les auberges et les pensions environnantes. Néanmoins, il y a des exceptions remarquables. L'auteur donne trois tableaux statistiques fondés sur des données obtenues des 95 premiers sanatoria du monde, dont 63 se trouvent dans les Etats-Unis, 2 au Canada, 13 en Allemagne, 11 en Angleterre et les autres en France, Autriche, Norvège, Russie et Suisse. On trouve une grande différence dans le nombre des calories consommées, qui se trouvent être entre 2,100 et 5,500, soit 160%. La variation dans l'élément protéïde est aussi frappante.

L'auteur conclut que 3,000 calories, dont 10% doivent être données sous forme de protéïdes, suffisent grandement pour les besoins journaliers du phtisique ordinaire. L'auteur montre aussi qu'un excès de protéïdes est nuisible aux phtisiques à cause de la putrefaction intestinale qui en résulte et à cause des produits de destruction provenant de l'oxydation des protéïdes; et à ces produits s'ajoutent encore, pour les protéïdes de la viande, les produits de destruction qui y sont contenus d'avance. Il y a, de nos jours, une forte tendance contre la diète composée de trop de viande et, en général, de trop de protéïdes, dans les cas de tuberculose. Ce changement est dü aux recherches de Chittenden, Folin, Herter, Metchnikoff et d'autres, qui ont montré que les protéïdes occupent une place beaucoup trop grande dans la diète de la plupart des nations occidentales.

THE DIET AND RÉGIME IN VOGUE IN THIRTY-FOUR TUBERCULOSIS SANATORIUMS.

By Richard Cole Newton, M.D.,
Montclair, N. J.

The following information was collected by means of a questionnaire sent to 40 or 50 sanatoriums, of which 34 sent replies. Most of the medical men addressed took considerable pains to present a satisfactory pen-picture of the dietary rules of their establishments, and some of them replied at great length to question No. 25. I desire to record my thanks for the courtesy and cheerfulness with which my inquiries were met. A list of the sanatoriums, with the name of the medical officer in charge, is appended. The first three questions asked for name of institution, situation, and name of superintendent.

Question 4.—Average number of patients. Thirty-three institutions answered this question. They represented an average population of 4818. The largest had 1515 inmates; the smallest, 10.

Question 5.—Do you take advanced cases? "Yes," 20; "no," 15; not answering, 2.

Question 6.—Number of meals a day. Twenty-nine furnish 3 meals daily; 2 furnish 5; 1 furnishes 4; 1 furnishes 2; and 1 furnishes 1. Lunches: 10 furnish 3; 5 furnish 2; 2 furnish 4; not specified, 3; 3 furnish none; 5 furnish lunch only as ordered; 2 furnish 2 or 3, and 1 furnishes 1, 2, 3, or 4.

Note.—Dr. Gilchrist believes, first, that meals should be regular whenever given. Second, if possible, four hours should intervene between meals. Third, three meals daily and nothing between. Fourth, milk taken only at meal-times.

Question 7.—Do you allow patients to eat between meals? Fourteen forbid eating between meals; 8 allow it on prescription, and 8 seem to allow it at any time.

Question 8.—Do you allow or encourage them to eat at night? Seventeen forbid eating at night, 5 allow it on prescription, and 4 seem to allow it as desired by the patients.

Question 9.—Are any regulations as to complete mastication of food ("Fletcherizing") prescribed? "No," 20; "yes," 7. No special directions, but encourage thorough mastication, 3. Advise slow eating, 1. Compelled to take one-half hour to a meal, 1. Talks given by dietitian on food and mastication, 1. No answer, 1.

Question 10.—Are any so-called digestives, such as pepsin, hydrochloric acid, pancreatin, ox-gall, taka-diastase, pineapple juice, caricans, etc., prescribed or allowed. "Yes," 30; "no," 4. Most institutions prescribe more or less hydrochloric acid. Many of them prescribe nux vomica also. A smaller number prescribe pancreatin. One medical officer says that nearly all consumptives need hydrochloric acid. Most of them assert that they use digestives only as specially indicated for the particular case, and in small quantities. Three only use them after an analysis of the stomach-contents.

Question 11.—Are spices or condiments, distilled of fermented liquors, wines, cordials, tea, or coffee allowed with, after, or before meals? Fourteen establishments forbid alcoholics entirely; 3 allow them very rarely; 1 permits wine or beer only in weak cases; 1 habitually allows small quantities with dinner or supper; 1 allows small quantities of alcoholics except cordials; 1 prescribes strong wines or brandies in exceptional cases, to overcome weakness of the heart; 1 reports that he is discontinuing the use of distilled liquors, prescribes malt liquors for a few, and allows wines with raw eggs.

One superintendent reports that about a quarter of his patients begin by using wine or beer, which they gradually give up later, drinking only water, as he does himself.

Dr. King, of the Loomis Sanatorium, has prescribed alcoholics in some form as a dietetic measure in from 5 to 10 per cent. of the tuberculous patients which have come under his care in the past fifteen years, and has never seen harm come from it, while in many cases it has rendered invaluable service.

At one establishment a small percentage of patients take milk for dinner, while the remainder are given a glass of red wine, or $\frac{3}{10}$ liter of light beer or cider. At 4 P. M. each patient receives 250 c.c. of coffee. In summer, lemonade made of lemons is given. In the evening they often get tea or $\frac{3}{10}$ liter of light beer.

The use of coffee and tea is practically universal, only one establishment reporting that these beverages are not used. Nearly all, however, restrict their use, several only allowing one cup of each daily, others specifying that they are made "weak." Some allow them only twice a day; 1 or 2 only allow them at breakfast; 2 allow them only to certain patients. One substitutes cereal coffee or cocoa for certain cases, whereas only 5 report that they impose no restrictions upon their use.

As to condiments, all the establishments seem to allow their use, although a few seem to restrict them.

Question 12.—Do you allow your patients to drink anything while eating? "Yes," 31; "no," 2. Direct milk to be drunk after solid foods are finished, 1. Yes, but with moderation; restrict liquids in certain gastric complications, 1.

Question 13.—Do you allow ice-water at any time. "No," 18; "yes," 11. "Yes, limited," 1. "Yes, in summer," 2. "Yes, but not advised," 1. "Yes, but I do not believe in it," 1.

Question 14.—Can you furnish a menu or bill of fare of the viands provided in your establishments? If not, will you please mention the principal articles of diet, and, so far as practicable, the quantities? Five stated that a menu could be furnished, but failed to send one. Practically all the establishments used milk, and several of them esteemed it the most valuable form of alimentation. One or 2 used an exclusive diet of milk, feeding every two hours in fever cases. Dr. von Ruck is opposed to the "promiscuous use of milk and eggs" and to any "one-sided diet." "When milk in any form enters largely into the diet, the patient gets enough proteid from it" (Dr. von Ruck). Dr. Gilchrist thinks that "a mixed diet, more or less approximating their customary diet, is best, including about two or three pints of milk." He gives raw meat (minced beefsteak) in flatulent dyspepsia, omitting potatoes. Toasted bread and half-pints of hot water to drink between meals do well.

One establishment insisted on one generous meal daily, consisting of as much meat (usually rare roast-beef or rare beef-steak), vegetables, and fruit as they wish; for the rest of the day, three quarts of milk and six raw eggs. Another provides six to fourteen glasses of milk daily, and four to eight eggs, with ordinary quantities of meats, vegetables, fruits, cereals, bread, etc. Another provides three meals daily of ordinary plain mixed diet, with meat. Eggs, milk, and cream are served at each meal. Another sanatorium furnishes such meals as "a prosperous mechanic or artisan" prefers, which contain, according to the superintendent, too large a proportion of meat.

Question 15.—Is the diet "measured" or "balanced" in your institution? *i. e.*, please state whether you determine the calories of fat, proteid, and carbohydrates. "No," 15; "yes, calorific value estimated by Atwater's tables," 3; "yes, balanced," 4; "yes, in exceptional cases," 1. One sanatorium provides for patients below weight food of the calorific value of 4.380 units per diem, which is reduced to 2600 calories as the patient's weight increases to normal. Another states that if patients are improving and their weight is increasing, they are not disturbed nor their diet forced. Those below normal must eat a balanced diet of a value of 2200 calories, which is altered to meet especial indications. Two establishments feed their inmates up to 3000 calories per diem. One feeds 4666 calories—792 proteid, 1877 carbohydrates, and 1997 fats (Atwater's tables). Another, measuring by same tables, feeds 3965 calories—830 proteid, 1665 fat, and 1470 carbohydrates. Another, measuring by Rubner's tables, feeds on the average 5828 calories. This calculation is considered very

liberal, since it greatly exceeds Voit and Pettenkofer's, whose allowance for a man doing hard labor is 3080 calories per diem. Another reports, "we are working to this end (*i. e.*, scientific balance of the diet), but have no satisfactory method yet."

Question 16.—If milk and eggs are used, will you kindly give the quantities and times of serving. Also, please underscore any of the following that are used: olive oil, butter, fruit or vegetable juices, nuts, potatoes, fresh or canned vegetables, beef, mutton, poultry, pork, cereals, pastry, etc.? Practically every establishment prescribes milk in quantities from three-fourths of a pint to four quarts. It appears to be usually taken with meals and between meals, *i. e.*, in the middle of the forenoon and afternoon, and quite frequently in the evening, and occasionally on rising in the morning. Eggs are also very generally used, usually raw, in number from one to two a day, up to eight or ten. None of the establishments reporting appears to be making use of fruit or vegetable juices, and many of them do not use nuts or olive oil, while quite a fair proportion use no pork.

Question 17.—Do you encourage the use of sugar or syrups? If so, can you express an opinion as to the dietetic and therapeutic value of sugar in consumption? Twenty-three answer "no"; 11 answer "yes," with some restrictions. One says only as part of the necessary amount of carbohydrates, according to Professor Fisher's diet machine, "extremely valuable when well borne." "It is a food greatly neglected." "Ice-cream, if taken very slowly, is very valuable and well borne by most patients" (von Ruck). Three encourage the use of sugar, but have no opinion to offer as to its therapeutic value. One sanatorium for women says that they discourage candy eating.

Question 18.—Are "stock" or meat soups, beef-extracts, or beef-tea used? Only 4 establishments use none of the articles in this list. A few use beef-tea as an appetizer, not valuing it as food. A few use beef-extracts and beef-juices, and nearly all use stock and meat soups.

Question 19.—Are the following used: salt or smoked meats or fish, shell-fish, fresh fish, common salt? Only one superintendent reports that none of the viands listed under question No. 19 are used in his establishment. One uses fresh fish once a week, but no salt or smoked meats. Another reports that salted food is used sparingly; common salt is "regarded as injurious."

Question 20.—Do you allow or restrict the use of tobacco? Seven institutions absolutely forbid tobacco. Nearly all the others restrict its use more or less. Nearly all prohibit it in laryngeal cases. Others allow smoking out of doors and after meals for some patients. One permits it as the least of two evils. Two of them confess that their efforts to stop it are unavailing, etc.

Question 21.—Have you any rules about water-drinking as a therapeutic measure? Twenty answer "no." Only 3 answer "yes" without qualification. One of these orders water to be taken 4 times daily. Another, at least 6 times, and 250 c.c. at a time. The third does not give his rules. One man advises it, but not as a therapeutic measure; another only when the patient has nephritis. Two give it for constipation and dyspepsia, and one orders it between meals when the patient is forbidden to drink it at meals because of indigestion. Another makes no rules, although he directs it to be taken, and still another believes in it, but does not order it.

Question 22.—Do you examine the patients' teeth? If so, can you tell the percentage having defective teeth? Eleven do not examine the patients' teeth; 5 examine them, but cannot give percentage that have defective teeth; 3 examine them and find a large number of bad ones without being able to give the proportion. One superintendent has the patients' teeth examined by a regular dentist. He states that probably over 75 per cent. have defective teeth. Another thinks that over 90 per cent. have bad teeth. A third observer says about 75 per cent. of his patients have dental caries, while another states that practically all consumptives have some defective teeth. Another says, nearly all. Another makes a good resolution that hereafter he will examine the teeth of all his patients. One sanatorium has a rule that no patient shall be admitted or retained who has defective teeth.

Question 23.—Do you insist on food requiring much mastication, like Bent's crackers, whole wheat bread, pilot biscuit, etc.? Twenty-eight answer "no"; and 3 answer "yes." One foreign superintendent says that such food is "much less necessary here, where the meals are not so quickly done, as in the United States, and people are used to chewing more or less well." Another superintendent, an American, says that he intends to provide such food in future, while another (Dr. Wethered) says, "Am slowly overcoming the bolting habit. The class of men we are now handling are the first we have had who will eat what they cannot bolt."

Question 24.—Do you individualize the diet according to patient's weight, previous history, table habits, stage of disease, etc.? Eleven answered "no"; 5 answered "yes"; 17 modified their answer. Most of them stated that they individualize chiefly according to the patient's weight, some giving milk, some carbohydrates and fats, one giving beer, etc., to bring up the weight. If the patient is above the proper weight for his height and age, his diet is lessened. One observer objects to patients gaining weight at a higher rate than a pound to a pound and a half a week. A special diet for those of delicate digestion is provided at Grabowsee.

Question 25.—Will you kindly give your present views and practice in regard to "forced feeding," and all that the term implies, and please add any remarks that may occur to you as likely to aid us in settling at least

some of the problems connected with the diet of consumptives? Your personal experience and observation are especially desired and will be highly valued. Practically all the superintendents are opposed to "forced feeding" except in emergencies, and several of them will not permit it under any circumstances. The answers are so varied and so full of interest that I have collated them in an appendix to this paper. It is certain that while there is still much to be learned in the matter of treating consumption, better methods prevail at the present writing than ever before, and they all point to the great truth that the means which are curative in this disease will surely prevent it, if employed early enough.

LIST OF INSTITUTIONS SUPPLYING INFORMATION, AND TO WHICH THE AUTHOR'S THANKS ARE DUE.

1. Maine Sanatorium for Incipient Tuberculosis, Greenwood, Mt. Hebron, Me.: Estes Nichols, Medical Director.

2. New Mexico Cottage Sanatorium, two and one-half miles from Silver City, N. M.: E. S. Bullock.

3. Palm Lodge, Phoenix, Ariz.: Dr. Henry H. Stone.

4. Royal National Hospital for Consumption and Diseases of the Chest, Ventnor, Isle of Wight, England; James C. Gilchrist.

5. Winyah Sanatorium, Asheville, N. C.: Dr. Karl von Ruck.

6. Camp Reliance, 1902–1904, now closed. Comfort, Kendall Co., Tex.: C. H. Wilkinson, M.D.

7. State Hospital, Tewksbury, Mass.: John H. Nichols.

8. Ottawa Tent Colony, Ottawa, Ill.: Drs. J. W. Pettit and E. H. Butterfield.

9. R. I. State Sanatorium, Wallum Lake, R. I.: Harry Le Barnes.

10. Montefiore Home Country Sanatorium, Bedford Station, N. Y.: D. L. Rosenberg.

11. Boulder Lodge Sanatorium, Ft. Dodge, Iowa: Jno. W. Kime.

12. Loomis Sanatorium, Liberty, N. Y.: Herbert Maxon King.

13. Nordrach Ranch Sanatorium, one and one-half miles from Colorado Springs: Dr. Jno. E. White, Dr. August L. Heinle, Assistant.

14. Southern Pines Sanatorium, Southern Pines, N. C.: Edwin Gladman, M.D.

15. Sharon Sanatorium, Sharon, Mass.: Walter A. Griffin, V. Y. Bowditch, Medical Director.

16. Philadelphia General Hospital, Philadelphia: Dr. Lawrence F. Flick.

17. Henry Phipps Institute, 238 Pine St., Philadelphia, Pa.: Dr. Lawrence F. Flick.

18. Sanatorium Grand Hotel, Leysin, Switzerland: Dr. Exchaquet.

19. Pottenger Sanatorium, Monrovia, Cal.: F. M. Pottenger, C. C. Browning.

20. Heilsanstalt Alland in Wienerwalde: Dr. Josef Sorgo.

21. Adirondack Cottage Sanitarium, Saranac Lake, N. Y.: E. L. Trudeau.

22. N. Y. State Hospital for Incipient Tuberculosis, Ray Brook, N. Y.: Albert H. Garvin.

23. Dr. Frank W. Gallagher, El Paso, Texas, Physician to Hôtel Dieu, a general hospital.

24. Agnes Memorial Sanatorium, Denver, Colo.: G. Walter Holden.

25. Grand View Institution for the Care and Treatment of Pulmonary Tuberculosis, Oil City, Pa.: F. P. McCarty, M.D.

26. Association Health Farm, Edgewater, Colo.: Jno. Wethered.

27. U. S. A. General Hospital, Ft. Bayard, N. M.: G. E. Bushnell.

28. Sanatorium Sankt Blasien, Black Forest, Baden: Dr. A. Sander.

29. Stony Wold, Lake Kushaqua, N. Y.: Henry S. Goodall.

30. The Millet Sanatorium, East Bridgewater, Mass.: Chas. L. Millet, M.D.

31. U. S. Marine Hospital Sanatorium, Ft. Stanton, N. M.: P. M. Carrington.

32. Bridge-of-Weir Sanatorium, Bridge-of-Weir, Scotland: John Guy.

33. Massachusetts Sanatorium, Rutland, Mass.: Frederick L. Hills, Superintendent.

34. Volksheilstatte von rothen Kreuz, Grabowsee bei Oranienburg: N. Growski.

35. Pokegama Sanatorium, Pine City, Minn.: H. Longstreet Taylor.

Appendix No. 1 on Forced Feeding: Dr. Harry L. Barnes, R. I. Sanatorium: "Do not believe in it if it produces indigestion."

Dr. Rosenburg, Montefiore Home: "Unalterably opposed. Favor more vegetable food."

Dr. J. M. Kime, Boulder Lodge Sanatorium: "Sometimes cut out lunches. Do not believe, however, that they interfere enough with meals, generally speaking, to overbalance good results."

Dr. Herbert M. King, Loomis Sanatorium, Liberty, N. Y., is opposed to forced feeding. Gives an instance of a man who had eaten 6842 calories of food per diem for a month and had gained 20 pounds. His digestion was "hopelessly ruined." He subsequently died. "Amongst consumptives a good digestion is rather the exception than the rule." Reports a patient doing well and gaining flesh on 2500 calories per diem, 88 gm. albumin, 129 gm. fat, and 197 gm. carbohydrates, or about 48 calories per kilo of body weight. Phenomenal gain in weight should at once arouse suspicion that the patient is being overfed. In such cases investigation will not

infrequently disclose the fact that 100 calories per kilo of body-weight are being taken. Three liters of milk divided into unequal portions, the largest to be given at ordinary meal-times, can be taken by most patients in twenty-four hours, representing 99 gm. proteid, 120 gm. fat, and 150 gm. carbohydrate, or 2.137 calories.

John E. White, Nordrach Sanatorium: "We have changed our views in six years in regard to overfeeding. Each patient has his capacity, and if food is pushed beyond this, we see frequent autointoxications. Patients usually do not gain weight without the lunches. Have tried eggs—from six to thirty-five a day—in individual cases without results as far as gaining flesh is concerned. Nearly always secure results from milk. We have repeatedly seen patients gain in weight, and have seen them die fat. In judging of the improvement of patients, the temperature is the safest guide, and bodily weight comes after it."

Dr. G. Walter Holden, Agnes Memorial Sanatorium, Colo.: "In spite of all said, I have had best results on three meals a day. An experiment was tried in which one-half of the patients took no food between meals, while the other half had three large meals, with intervening lunches. The former did better in every respect."

Dr. F. P. McCarty, Grand View Institute, Oil City, Pa.: "Insist on patients taking as much milk and eggs as possible. These are only reduced in quantity when the stomach rebels. The gain in weight is in proportion to the quantity of milk and eggs which are eaten. A pamphlet of "Suggestions to Patients" issued by this sanatorium contains no allusion to diet or methods of eating."

Dr. Wethered, Association Health Farm, Edgewater, Colo.: "Do not believe that a man can be intemperate in anything without having to settle for it sooner or later."

Dr. G. E. Bushnell, U. S. A. General Hospital, Fort Bayard: "It is my opinion that forced feeding is only in place in isolated cases in which there is an abnormal distaste for food."

Dr. A. Sander, Sanatorium St. Blasien, Black Forest, Baden: "Forced feeding is not used, since it is impossible to employ it for any length of time. In cases of anorexia artificial and concentrated foods used."

Dr. H. S. Goodall, Stony Wold, Lake Kushaqua, N. Y., believes in as full a diet as the digestion can stand. Great care must be taken not to overtax it.

Dr. C. S. Millet, The Millet Sanatorium, East Bridgewater, Mass.: "I do not feel that forced feeding is a *sine qua non*. The essence of the treatment is rest out-of-doors. If the case is curable, sooner or later 'digestion will wait on appetite and health on both.' "

Dr. Gilchrist, Royal National Hospital for Consumptives, Ventnor,

Isle of Wight: "Patients who have not the grit to eat any decent food will not get better at all in my experience. Raw meat is the only food I have ever noticed to have an apparently specific influence on the course of a case, and I am quite doubtful about that."

Dr. Carrington, U. S. Marine Hospital Sanatorium, Fort Stanton, N. M.: "Opposed to forced feeding. We allow those with good appetites to follow their inclination, and urge those with poor appetites to eat more than they feel like eating."

Dr. Hills, Massachusetts Sanatorium, Rutland, Mass.: "The dietary is in charge of a graduate dietitian. The caloric value of the food varies from 3500 to 4000 calories per diem. We employ forced feeding in certain cases, but not as a rule."

Dr. H. Longstreet Taylor, Pokegama Sanatorium: "Forced feeding has no place in my establishment. I think it has harmed my patients. I believe in three square meals, thoroughly masticated, with plenty of time between for the stomach to be emptied and rested."

Dr. Estes Nichols, Maine Sanatorium, Hebron, Me., believes that the normal rate must be reached. Has seen patients seriously injured by continuing forced feeding after their weight has been brought up to normal. This is one cause of nephritis. The doctor thinks that we should use plenty of fresh vegetables and avoid too much oily food. He had 100 patients last year whose average loss of weight was 22 pounds when they entered the sanatorium. Under proper treatment their average gain was 22 pounds 15 ounces. He doubts whether any method of determining the best diet can be found to supersede the clinical.

Dr. E. S. Bullock, New Mexico Cottage Sanatorium: "Forced feeding is a fad much abused. Often especially high percentages of proteid ruin the kidneys, and should only be resorted to in emergencies."

Dr. H. H. Stone, Palm Lodge, Phoenix, Ariz.: "Individualize in feeding. I try to insist on 3000 calories in the food daily as a minimum."

Dr. C. H. Wilkinson: "Diet must be modified to suit individual symptoms. It must be taken in moderation and regularly. Valueless unless associated with constant open-air treatment."

Dr. J. H. Nichols, State Hospital, Tewksbury, Mass.: "Indiscriminate forced feeding often harmful."

Drs. Pettit and Butterfield, Ottawa Tent Colony: "I do not believe in forced feeding. A consumptive can be coaxed to eat what he should by permitting him to have something theoretically improper."

Dr. E. Gladman, Southern Pines Sanatorium: "Forced feeding, as the term is generally used, is injurious to some and of doubtful benefit to any."

Dr. Griffin, Sharon Sanatorium: "I am less inclined to forced feeding

than I was a few years ago. Urge extra lunches when the patient is eating less than normal conditions demand."

Dr. Exchaquet, Sanatorium, Grand Hotel, Leysin, Switzerland: "I have seen so many patients suffering from forced feeding, or suralimentation, before they came here, that I abstained from it from the beginning of my practice here eleven years. It was originally done in Germany when they were big eaters. I think three meals quite sufficient for most patients, when they learn to eat. Increase of weight is very often seen when patients begin to eat less than they did under suralimentation."

Dr. F. M. Pottenger, Pottenger Sanatorium, Monrovia, Cal.: "I believe that forced feeding is wrong in principle, unscientific, and harmful. . . . I believe that the best rule for feeding tuberculous patients is to have them eat the least quantity of food consistent with proper nourishment, this to be chewed thoroughly, eaten slowly, and taken at such intervals as will allow the stomach to be thoroughly emptied of the last meal before the next is taken. Fat of itself is not a criterion of strength. When I think of all the mass of food that has been crammed down the throats of these poor patients under the name of scientific treatment I often wonder if our profession has gone mad."

Dr. Lawrason Brown, Adirondack Cottage Sanitarium: "I use forced feeding in very few cases. I feel that patients who do well on good general diet do better in the long run than those who take considerable forced feeding."

Dr. A. H. Garvin, N. Y. State Hospital for Incipient Tuberculosis, Ray Brook, N. Y.: "Our patients are encouraged to eat an ordinary diet, and slightly more if they are able. No vigorous forced feeding is employed. The dietary varies from 4273 calories to 4791 per diem."

Dr. Frank W. Gallagher, El Paso, Texas, Physician to the Hôtel Dieu: "If fever and malaise are present, I advise a pretty strict diet of broiled beefsteak (all the patient will take), with toasted bread, and two raw eggs after each meal. Where no idiosyncrasy exists against it, we give a pint of milk with each meal. Three full meals are better than meals with intervening lunches."

AN EXPERIMENT IN DIET AT THE ANNEX OF LOOMIS SANATORIUM.

By Herbert Maxon King, M.D.,

Liberty, N. Y.

There are two methods of regulating the diet of a tuberculous invalid. The first, which is comparatively easy of application, whether applied at home or in the sanatorium, consists briefly in permitting the patient to eat what he pleases and to keep an approximately accurate record of all food ingested, estimating from time to time the constituency of the food taken, and upon the results of such estimates basing future advice. This plan, which is, I think, the one usually followed, is at best unsatisfactory, inaccurate, and unscientific. The second method, which is much to be preferred, but which can scarcely be carried out effectively outside an institution, consists in constructing a diet from prescription to represent more or less exactly a definite arrangement of constituent elements and a definite calorific value. Most tuberculous invalids labor under the fallacious impression that the cure of tuberculosis is a matter of stuffing, and that eggs and rich milk are essential to the consumptive's diet, if not actually specific in their action. Such a preconception is one of the most difficult prejudices to overcome, and forms one of the most troublesome annoyances in sanatorium practice. Left to himself, the consumptive is prone to substitute rich milk and raw eggs for the more normal and beneficial mixed diet. Eggs and milk are easily taken, require no mastication, and the patient, who is, unfortunately, too often taught that in them lies almost certain cure of his disease, is very apt to neglect the exercise of the functions of mastication and salivation and the undoubted benefits which accrue from a generous but not too large mixed diet properly eaten. The inordinately large diet is not only harmful, but extravagant, and in the treatment of the consumptive poor this latter feature is one which must be considered. Bardswell, Chapman, Goodbody, and others who have been paying much attention to dietetics in tuberculosis during the past eight years have repeatedly shown that an overabundant diet, like a poorly constructed diet, is capable of working mischief to the digestion of the patient. It is a matter of common observation to meet digestive disturbances among tuberculous invalids of all classes, both in and out of sanatorium practice, while it is not an infrequent experience to find irreparable damage having been done by a long-

continued effort at hypernutrition, especially where the ubiquitous eggs and milk have constituted the bulk of the dietary.

During the early spring of 1906, in the course of some dietetic experiments carried out at the annex of the Loomis Sanatorium, I found that our annex dietary approximated 3950 calories per patient per day, made up of 156 grams of protein, 215 grams of fat, and 322 grams of carbohydrates. This generous diet cost the institution, on a basis of 50 persons (40 patients and 10 employes), the number upon which the estimates were based, 35 cents per person per day. Even on this diet digestive disturbances were not uncommon. Of the 40 patients, it was the usual thing to have 3 to 8 confined to bed from one cause or another, and, I venture to say, from digestive disturbance or its result in the majority of cases. The increasing cost of food-material gradually increased the cost of our annex diet until, in the spring of this year, I found it to be running from 38 to 40 cents per patient per day. During the past summer I have endeavored to construct a diet at our annex which should combine the maximum efficiency with the minimum cost. To this end I substituted for the ordinary cooks formerly employed a skilled dietitian and her assistant, both graduates of an excellent school of domestic science. All the work of detail was turned over to the dietitian, who was given, from time to time, the diet prescriptions in terms of proteins, fats, carbohydrates, and calories. About six weeks were spent in preliminary experiment to determine chiefly the practicability of certain points which it is unnecessary for me to detail on this occasion. I had for some time felt that a properly constructed diet, well cooked and nicely served, need not exceed over 3000 to 3500 calories per person per day; that such a diet need not necessarily comprise the enormous number of eggs which had formerly constituted such a large bill of expense in this division of the sanatorium; that, moreover, a first-grade "margarin" could be utilized to considerable advantage, not only economically, but from a dietetic point of view as well, to replace the so-called "cooking butter," and that separated milk might, in the majority of cases, be substituted for whole milk on exactly the same grounds. My instructions to the dietitian were to furnish a mixed diet, which should contain approximately 125 grams protein, 100 grams fat, and 400 grams carbohydrates. I am able to present to you to-day a summary of this work and its results for the month of August. On the basis of 54 persons (comprising 42 patients and 12 employees) the average diet for the month per person per diem actually worked out as follows:

Proteins	129	grams
Fats	110	"
Carbohydrates	377	"
Calories	3107	"

There was a minimum of waste, and the food was excellently prepared from the best material of its kind obtainable. Looked at from the economic point of view, following is the actual provision expense, which includes the slight unavoidable waste:

STATEMENT OF EXPENSE, AUGUST, 1908.

Fruit	$22.23
Vegetables	25.83
Butter	33.63
Oleo., olive oil, etc	14.35
Meats	91.98
Fish	18.12
Bread, rolls, etc	17.18
Groceries	74.10
Eggs (132½ dozen, or approximately one egg per person per day, including those used in cooking)	37.10
Milk and cream (2601 quarts, or approximately 1.6 quarts per person per day)	104.04
	$438.56

Average per person, 26¾ cents per day.

I may add that all the milk was separated. The cream was used for coffee, cereal, certain fruits, puddings, etc. The separated milk alone was employed as a beverage. The daily menus for the month (exclusive of the intermediate diets, consisting of separated milk), as submitted to me by the dietitian at the end of the month, I offer for your inspection. I may say that the actual cost of this dietary was 26¾ cents per person per diem, a saving of from 10 to 14 cents per person per diem over the cost of the old dietary, which something more than made up for the increased cost incident to employing trained dietitians in the place of ordinary cooks.

The results of the use of this dietary from a medical point of view are, it seems to me, most interesting. In the first place, notwithstanding the season of the year when digestive disturbances are most liable to occur, we had not a single illness attributable to that cause, and, in the second place, of the 42 patients, 34 made substantial gains in weight, averaging something over 1.173 kilos; only 7 lost, and these 7, an average of 0.851 kilo, one remaining stationary.

The annex of the Loomis Sanatorium is intended for incipient or early-stage ambulant cases, but, like most institutions of the kind, only a comparatively small number fall strictly under such a classification. For instance, of the 42 patients in the annex during the month of August, only 5 could be classified as "*incipient.*" These 5, I may add, all gained in weight. *Fourteen* of the 42 patients were classified as "*moderately advanced,*" and of these 14, 9 gained in weight, while 5 lost. The remaining 23 patients were classified as "*far-advanced*" cases. Nevertheless, in this class the surprising

result followed that of the 23, 21 gained in weight, and only 2 lost. Of the 42 patients, 7 were under twenty years of age, of which 3 were under twelve years of age. Of the others, 3 were above normal weight at the beginning of the month; 18 were 10 per cent. or less below normal weight; 10 were between 10 and 20 per cent. below normal weight, and 4 were more than 20 per cent. below normal weight, using the rather severe standard of normal known as the "Nylic standard." Of the incipient cases, every patient was on prescribed exercise, usually consisting of graded manual labor, carefully prescribed according to the condition and strength of the patient. Of the moderately advanced class, all but one were on such exercise and graduated labor. Of the far-advanced class, all but three were on exercise or graduated labor.

In introducing this systematic régime as to diet and labor, we had, of course, to contend with the usual objections, criticisms, and complaints incident to any change of régime. As soon, however, as the patients were made acquainted with the object of the experiment we had their hearty coöperation. During the preliminary work of June and July short talks for the purpose of preparing the patients for the necessary changes in régime were given at frequent intervals. I can recall only two or three perverse patients who refused to coöperate, and either left or were discharged from the institution. Before the end of August almost every patient had voluntarily expressed satisfaction with the change in régime, and declared that they felt much better than when on the old plan of large diet and no regularly prescribed work.

DISCUSSION.

Dr. Vergara Lope, Mexico City, will present a paper on the subject of altitude in its connection with tuberculosis at the section meeting Friday afternoon.

The climate of high altitudes, he said, is not presented to Europeans or Americans as to himself, since Mexico City has an altitude of 2268 meters. This high altitude presents ideal temperature, gives the best conditions for the breathing of pure air and for favorable physiological changes. The temperature of Mexico City is, on an average, 15°.

He advised that all patients be sent to high altitudes, and spoke briefly upon the effect of the high altitudes of Mexico upon the blood.

Mr. Herbert de C. Woodcock (Leeds, England): The subject of treatment has been approached from the point of view of the man chiefly in charge of middle-class and high-class patients. Consumption in the wage-earning class is an entirely different disease from the point of view of treatment. A poor man must give his whole time or not enter the factory. Dr. Williams' illustration of the watchmaker, able to move from city to city, was

not a sample of the ordinary workingman, who must work full hours. Sending such a man to the sanatorium for three months improved him, but did not fit him for doing eight to ten hours of hard work. Dr. Clifford Allbutt stated that two winters and three summers formed the minimum time for treatment. Saying this, he said, "he trembled at his moderation." A system of working colony was required. A patient, after strict sanatorium treatment, should be transferred to the colony where he could be more or less self-supporting, and where he might learn a form of employment for supporting himself in after-life not inimical to health. Dr. Flick, in his approach to the subject, had the view of the dispensary or hospital physician, which does not cover the whole ground, for he saw little of home life. I have known patients to leave employment, enter sanatoriums, remain three months, return to employment, and find their posts filled, and then they have received employment worse than what they had previously.

Professor Von Leube (Wurzburg) remarked that he believed that the older clinical methods of auscultation and percussion are usually sufficient to establish the diagnosis of tuberculosis without the use of radioscopy. In doubtful cases the *x*-rays are of great value if they reveal suspicious areas in the lungs. But if no evidence of tubercular change is demonstrated, it is not sure that they are not present in case the change is too small to be discovered by the *x*-rays. The negative result of an *x*-ray examination gave, therefore, consolation to the patient, but not to the physician, who must continue to observe the case further. In addition he believes that though the *x*-rays were a very important means of examination, auscultation and percussion would always be, even in the future, the first and most usual and important methods to be used in investigating the diseases of the chest.

Dr. C. L. Minor (Asheville) remarked that perhaps the most important point brought out by the papers was that the clinician should be familiar enough with the use of the *x*-rays to be able to do his own *x*-ray examinations with a reasonable degree of expertness; or that the *x*-ray expert should be a clinician. In any case, the best results were obtainable when one man conducted capably both examinations.

x-Ray examination with the fluoroscope should be a routine part of every examination. For himself, he had carried this out in a large number of cases, and if he were to résumé the results of these, as to the question of diagnosis, he would say that the earliest cases cannot be diagnosed by the *x*-rays. The earliest clinical sign with which we were familiar was the roughening of the respiratory sound, the "respiration rude" of Grancher. Cases which showed this sign, in his experience, gave absolutely no evidence of lesions under the fluoroscope.

Dr. Frederick I. Knight (Boston): When I was asked to limit my

remarks to ten minutes, I thought it best to confine them to one of the topics only, viz., "The Comparative Importance of Treatment in Sanatoria Near at Hand and an Entire Change of Climate," and to reduce them to writing, but in the light of recent experience I cannot refrain from saying a word in regard to early diagnosis. There can be but one opinion of the preëminent importance of early diagnosis, but great care should be used that it is well grounded. So much has been said in regard to its necessity that I am sure that many cases have been positively diagnosticated as pulmonary tuberculosis, especially by the younger men, which were not tuberculosis at all, and thereby much serious inconvenience and expense, to say the least, have been brought to the patients, and unmerited reports of cures of tuberculosis have, in consequence, been made.

Dr. Theodore Williams (London) remarked that he agreed with Dr. Flick on the importance of early diagnosis and the importance of depending on the physical signs without waiting for the appearance of the tubercle bacillus. In response to Dr. Woodcock, he said that he included the treatment of workingmen in his paper.

Dr. Rist (Paris) said that with reference to the remarks of Professor von Leube in the matter of diagnosis, he would point out that the presence or the absence of tuberculosis was not the only question to decide; that, on the contrary, it was sometimes even more important in cases of definite tuberculosis to decide the question of such things as what form of lesion was present, what its extent, and what its age; and that, for these things, the value of the *x*-rays was not infrequently greater than that of the ordinary clinical examination; that thus, while auscultation and percussion were still certainly our most reliable signs of the presence of tuberculosis, they had to be supplemented and could be amplified, in very many instances, by reliable *x*-ray examination.

In closing the morning session, the president announced that the section would meet at half-past two o'clock, in joint session with Section I, for a discussion of:

THE OPSONIC INDEX: CONJUNCTIVAL AND CUTANEOUS TUBERCULIN REACTIONS: SERUM DIAGNOSIS.

(See page 387.)

SECTION II.

Clinical Study and Therapy of Tuberculosis. Sanatoria, Hospitals, and Dispensaries (*Continued*).

THIRD DAY. MORNING SESSION.

Wednesday, September 20, 1908.

A Symposium on
SPECIFIC THERAPY OF PULMONARY TUBERCULOSIS.

PART I.—TUBERCULIN AND ITS DERIVATIVES.

Section II of the International Congress on Tuberculosis was called to order by the President, Dr. Vincent Y. Bowditch, at half past nine o'clock.

LE TRAITEMENT DE LA TUBERCULOSE PAR LES TUBERCULINES, ET PLUS SPÉCIALEMENT PAR LA TUBERCULINE BÉRANECK.

PAR PROF. ED. BÉRANECK,
Neuchatel, Suisse.

Dans ce rapport, je laisserai de côté la sérothérapie, c'est-à-dire l'immunisation passive de la tuberculose. Je passerai rapidement en revue, les procédés mis en oeuvre pour obtenir l'immunisation active de la tuberculose. J'indiquerai sommairement les résultats obtenus et les conclusions qui en découlent, puis je montrerai ce qu'on est en droit d'attendre, au point de vue curatif, de ma tuberculine en particulier.

D'une manière générale, l'immunisation d'un animal neuf a pour but de

le rendre réfractaire à une maladie infectieuse donnée, en adaptant cet animal par une éducation bien comprise, à la lutte contre le microbe, agent de l'infection. A la suite de cette adaptation, les moyens naturels de défense de l'organisme sont exaltés au maximum de manière à rendre inoffensifs puis à détruire des bacilles qui auparavant auraient certainement déterminé une infection mortelle.

En ce qui concerne l'animal neuf, nous pouvons règler à volonté cette adaptation de façon que l'organisme réponde, dans les conditions les plus favorables pour lui, aux stimulants qui doivent renforcer ses moyens naturels de défense. Ces stimulants sont nécessairement nocifs, mais nous en dosons la nocivité en vue de l'immunisation spécifique que nous nous proposons d'atteindre; ce sont suivant les cas soit les microbes eux-mêmes d'ordinaire attenués, soit les toxines que ces microbes sécrètent. Ce faisant, nous nous placons dans des conditions autrement plus favorables que si nous laissions l'immunisation se faire au hasard d'une infection naturelle. Il va de so. que l'adaptation dont je viens de parler, sera plus facile à provoquer avec certains microbes qu'avec d'autres et qu'elle variera dans une large mesure d'une espèce animale à l'autre.

L'angle sous lequel nous envisagerons le traitement spécifique de la tuberculose dependra de la réponse que nous donnerons à cette question: Est-il possible d'immuniser l'animal neuf contre la tuberculose? Dans l'état actuel de la science, il serait téméraire de donner à cette question une réponse catégorique. On ne doit pas perdre de vue que la tuberculose est une maladie chronique, à évolution plutôt lente de sorte que les observations pour être démonstratives devront porter sur un laps de temps considérablei En outre, les bacilles tuberculeux sont difficilement détruits par l'organisme; ils peuvent rester latents dans les tissus sans manifester pathologiquement leur présence, quitte à reprendre l'offensive lorsque les conditions de résistance de l'hôte qui les héberge se seront modifiés. Le bacille de Koch possède donc des caractères biologiques et pathologiques qui rendent très difficile l'appréciation du degré d'immunisation auquel les méthodes actuellement en usage permettent d'atteindre.

Cette difficulté d'appréciation ressort très nettement des résultats contradictoires fournis par la méthode d'immunisation dite de bovo-vaccin de Behring. La célèbre expérience de Melun sous la direction de Rossignol et Vallée, a montré que les veaux traités par la méthode de Behring résistent à l'épreuve très sevère de l'inoculation intraveineuse de 4 miligr. 5 de bacilles bovins très virulents. Mais, cet état refractaire des bovidés vacinnés n'est que temporaire, et s'épuise après un certain laps de temps. Il ne va pas jusqu'à la destruction complète des bacilles injectés puisque d'après Vallée, l'inoculation au cobaye des ganglions trachéo-bronchiques des bovidés vaccinés "s'est montrés positive pour 9 d'entre eux sur 13." Les expériences

de Eber (Leipzig) sont à certains égards encore plus démonstratives. Elles établissent qu'un certain nombre parmi les bovidés vaccinés, puis placés dans les conditions ordinaires d'existence de ces animaux, sont devenus quand même tuberculeux dans les trois ans qui ont suivi la vaccination.

Après le bovo-vaccin, d'autres modes d'immunisation contre la tuberculose ont vu le jour. Ce sont entre autres les procédés de Roux et Vallée, de Calmette et Guérin (voie stomacale); de Moussu en France, de Heymans en Belgique (cultures in vivo dans des bougies Chamberland ou dans des sacs de collodion); de Koch (Tournman).

De l'ensemble des expériences faites avec ces différents procédés, il ressort que l'on réussit à conférer une immunité marquée contre la tuberculose expérimentelle ou naturelle. Mais, à part quelques cas exceptionnellement favorables, cette immunité n'est que relative et sa durée est plutôt limitée. Aussi certains esprits pessimistes ont-ils soutenu que, contrairement à d'autres microbes, le bacille de la tuberculose ne joint pas de la propriété de vacciner l'animal contre l'affection qu'il détermine. Cette manière de voie est certainement fort exagérée, puisque avec les procédés actuels d'immunisation la résistance de l'organisme à l'infection tuberculeuse est suffisamment accrue pour que les animaux vaccinés supportent temporairement des épreuves qui sont mortelles pour les témoins (inoculation intraveineuse de bacilles virulents). Du reste, nos procédés d'immunisation sont susceptibles de perfectionnement. Les récentes expériences de Weber et Titze (1) ne montrent-elles pas que l'inoculation intraveineuse de bacilles humains virulents, fraîchement cultivés, confère aux bovidés, contre la tuberculose bovine, une immunisation plus forte et plus constante que le bovo-vaccin. Toutefois cette vaccination n'est pas encore parfaite et son effet s'affaiblit déjà après un an.

Quelles sont les causes qui rendent si difficile la vaccination antituberculeuse? La tuberculose est généralement une maladie chronique dont l'echéance fatale est d'ordinaire élonguée, et dans laquelle la notion d'intoxication est dominée par la notion d'infection. Le bacille de Koch ne tue son hôte que lentement et il a acquis de ce fait des moyens de défense spéciaux. S'il est par lui-même un producteur plutôt faible de toxines, il se laisse par contre difficilement détruire par l'organisme dans lequel il a pénétré. Ainsi que l'observation le démontre, ce bacille peut vivre des mois et même des années dans les ganglions lymphatiques de son hôte sans manifester sa présence par des symptômes cliniques appréciables, mais ausis sans perdre sa vitalité et sa faculté de prolifération. Le bacille de Koch est donc difficilement tué et digéré par son hôte; c'est pourquoi, malgré le chimiotaxisme positif qu'il exerce sur les leucocytes, il n'est d'ordinaire pas résorbé par ces derniers.

On attribue habituellement à la présence d'une gaîne de matières grasses,

la grande résistance que le bacille de Koch offre à la digestion phagocytaire. Cette gaîne joue sans aucun doute un rôle protecteur, car les composés aliphatiques qui la constituent sont difficilement digestibles. Elle permet au bacille tuberculeux de mieux résister à l'action dissolvante des diastases leucocytaires. Cependant; il ne faut pas exagérer l'importance de cette gaîne au point de laisser dans l'ombre le rôle offensif et défensif prépondérant joué par les endotoxines qui représentent les armes de combat les plus redoutables du bacille de Koch. Les expériences bien connues de Metalnikoff nous en fournissent la preuve.

Depuis les observations de Metchnikoff on sait que les chenilles de la mite des ruches (Galleria melonella) qui se nourrissent de cire, jouissent aussi de la propriété de digérer les bacille tuberculeux humain. Metalnikoff a repris ces recherches et a montré que les bacilles tuberculeux humains, injectés dans la cavité du corps des chenilles de ces mites sont plus ou moins rapidement digérés soit par les leucocytes isolés, soit par les leucocytes soudés en plasmodes. Cette digestion n'est pas due uniquement à la lipase contenue dans les leucocytes de ces chenilles de Galleria. Si ces leucocytes détruisent les bacilles humains c'est qu'ils résistent à l'action nécrosante appartenant aux endotoxines bacillaires d'origine humaine, et que les dilastases protéolytiques de ces leucocytes ont le pouvoir de digérer les nucléo protéines constituant le corps du bacille de Koch, type humain. D'après les observations de Metalnikoff, les bacilles tuberculeux pisciaires (type des poissons), inoculés dans le corps des chenilles de la Galleria sont aussi englobés par les leucocytes; mais, au liue d'être digérés, ces bacilles déterminent la nécrose de ces leucocytes et produisent une infection généralisée qui tue les chenilles en quelques jours. Or, la lipase de la Galleria attaque aussi bien la gaîne aliphatique des bacilles tuberculeux pisciaires que celle des bacilles tuberculeux humains. En effet, les bacilles pisciaires préalablement tués, puis inoculés, sont parfaitement digérés par les leucocytes de la chenille. Pour expliquer l'infection de la Galleria par le bacille tuberculeux pisciaire il faut donc faire intervenir un autre facteur que la gaîne aliphatique, et ce facteur n'est autre que les endotoxines diffusant du corps des bacilles pisciaires. C'est à la même cause qu'il faut attribuer l'infection tuberculeuse de l'homme et des animaux, par les bacilles soit du type humain, soit du type bovin.

Ainsi, sous la protection de sa gaîne aliphatique, le bacille tuberculeux englobé par les phagocytes, laisse diffuser des endotoxines qui paralysent l'action bactériolytique des diastases de ces phagocytes en provoquant la nécrose de leur cytoplasme. Il résulte de ce qui précède que pour obtenir une immunisation parfaite et durable il faut que les cellules protectrices des animaux vaccinés soient devenues aptes à résister à l'effet nécrosant des endotoxines bacillaires, à digérer le bacille tuberculeux. Tant que nous re-

trouvons dans les ganglions des animaux vaccinés, des bacilles de Koch qui se montrent encore virulents pour le cobaye, l'immunisation obtenue ne sera que relative et temporaire. Jusqu'à présent, on ne s'est pas suffisamment préoccupé du sort des bacilles fonctionnant comme vaccin. Un vaccin tuberculeux ne mérite ce nom que s'il est assimilé par l'animal auquel on l'inocule, de manière à renforcer les moyens de défense de cet animal contre une infection tuberculeuse naturelle ou expérimentale. Le bacille tuberculeux humain est considéré comme le véritable vaccin de la tuberculose des bovidés et cela parcequ'ils détermine dans la règle, inoculé aux bovidés, une forme attenuée de tuberculose. C'est déjà beaucoup, mais c'est insuffisant, car la question est de savoir si ce vaccin d'origine humaine est réellement assimilé par l'animal auquel il a été inoculé. Les récentes expériences de Weber et Titze déjà citées, montrent que cette assimilation ne se fait qu'avec une extrême lenteur, si tant est qu'elle se fasse, puisque ces savants ont retrouvé, chez des bovidés vaccinés, des bacilles humains ayant conservé tous leurs caractères après 19 mois de séjour. Nous courons ainsi le risque d'avoir deux infections, l'une humaine, l'autre bovine qui se contrecarrent plus ou moins l'une l'autre, mais dont la première plus bénigne ne confère pas une solide immunité parceque tout en demeurant latente, elle n'a pas été vaincue par l'organisme qu'elle devait vacciner. Ne savons-nous pas que chez l'homme, on a de même observé la coexistence de deux types de tuberculose, le type humain et le type bovin. Tout en reconnaissant la possibitilté d'immuniser dans une large mesure les bovidés à l'aide de bacilles humains virulents, ces faits doivent nous rendre prudents, et nous engager à perfectionner nos procédés d'immunisation qui ont comme point de départ l'inoculation de bacilles tuberculeux vivants et virulents. En partant d'une variété de bacilles qui,—tout en donnant une infection bénigne à l'organisme—ne contribue pas suffisamment à renforcer le pouvoir bactériolytique des phagocytes de l'animal inoculé ainsi qu'à activer la production d'anticorps, on fait une vaccination imparfaite. Etant donné les caractères assez tranchés qui séparent les variétés bovine et humaine de bacille tuberculeux le mieux serait d'utiliser comme vaccin la variété même contre laquelle on cherche à immuniser puisque cette variété est la mieux adaptée aux conditions biochimique de l'espèce animale dont elle constitue l'agent infectieux par excellence. Il faudrait par conséquent, immuniser les bovidés aux dépens d'un bacille bovin fonctionnant comme vaccin, et l'homme, aux dépens d'un bacille humain. Cette manière de procéder semble rationnelle carrien ne prouve que des leucocytes bovins en état de digérer des bacilles du type humain, soit de ce fait à même de digérer des bacilles du type bovin. L'exemple de la Galleria melonella est typique à cet égard; les leucocytes de cet mite qui digèrent si facilement les bacilles tuberculeux humains sont nécrosés par les bacilles tuberculeux pisciaires qu'ils sont impuissants à

détruire. Les expériences de Calmette et Guérin qui partent, pour l'immunisation des bovidés, de bacilles type bovin introduits par la voie stomacale semblent donner de bons résultats. Peut-être aussi que l'on réussira à transformer par des procédes chimiques, les bacilles tuberculeux homotype ou hétérotype, en vaccins; c'est dans cette direction que je pousse mes recherches en ce moment.

De ce rapide exposé je conclus que le bacille tuberculeux jouit bien de la propriété de vacciner l'animal neuf contre l'affection qu'il détermine, mais que les moyens de défense dont dispose ce bacille rendent l'application de nos procédés de vaccination particulièrement delicate. Toutefois, les résultats obtenus jusqu'à présent justifient l'emploi, dans la thérapeutique humaine, d'un traitement spécifique, ayant pour base le bacille tuberculeux et ses produits de sécrétion.

Immuniser l'animal neuf contre la tuberculose n'est pas chose facile, mais guérir un malade déjà en puissance de tuberculose est un problème autrement plus difficile à résoudre. Etudions tout d'abord quelles sont les conditions que nous devions pouvoir réaliser pour avoir quelque chance de réussite. Pour instituer, en connaissance de cause, un traitement curatif spécifique de la tuberculose, nous devions determiner dans chaque cas, les influences réciproques qui se sont exercées entre le bacille de Koch et l'hôte qui l'héberge. Pratiquement, c'est impossible; contentons-nous d'envisager la question à un point de vue général.

Le bacille tuberculeux qui a pénetré dans un organisme favorable à son évolution, ne demeure pas passif. Ce bacille est un être vivant, et comme tel il emprunte au milieu ambiant les matériaux nutritifs nécessaires à son cycle vital; il secrète dans ce milieu des toxines qui à leur tour exercent sur le malade un certain effet pathologique. Ainsi, en moment où l'on institue le traitement spécifique, le tuberculeux héberge déjà un bacille plus ou moins virulent contre lequel ses moyens naturels de défense sont impuissants à lutter. L'infection plus ou moins étendue s'accompagne d'une intoxication d'intensité variable. Nous avons en conséquence un double but à poursuivre; enrayer l'infection en renforçant la résistance des leucocytes à l'action nécrosante du bacille tuberculeux et en activant le pouvoir bactériolytique des diastases leucocytaires favoriser la production d'anticorps qui neutralisent les toxines sécrétées et qui sensibilisent le bacille de Koch de manière à faciliter sa destruction par les leucocytes. Pour atteindre ce double but, nous ne pouvons recourir à l'inoculation de bacilles vivants ou même attenués comme cela se pratique lorsqu'on cherche à immuniser l'animal par un traitement préventif. Car, il nous est impossible de mesurer l'effet pathologique que produirait un semblable vaccin s'il était inoculé à un organisme en puissance de tuberculose. Nous pouvons d'autant moins nous servir de bacilles vivants même attenués que nous connaissons la difficulté avec laquelle ces

bacilles sont résorbés même par les leucocytes de l'animal neuf. Nous devons donc recourir à des toxines solubles retirées soit du bouillon de culture, soit du bacille lui-même, toxines qui sont plus absorbables par l'organisme et dont nous sommes mieux à même de doser l'action pathologique. Mais une question préalable se pose: toutes les toxines sécrétées par le bacille tuberculeux ou contenues dans le corps de ce bacille excrètent-elles la même action curative?

Comme nous le verrons, l'expérience repond: non. Mais, alors, lesquelles choisir? Le problème est complexe car nous avons à envisager (a) les toxines aliphatiques formant la gaîne protectrice du bacille tuberculeux, (b) les exotoxines sécrétées par ce bacille dans son bouillon de culture, (c), les endotoxines constituant la masse protéique du corps bacillaire.

Les toxines aliphatiques sont-elles appelées à jouer le rôle d'un vaccin? Je ne le crois pas, malgré les conclusions favorables que Metalnikoff tire de ces expériences. Le basant sur la présence, dans le corps de la Galleria melonella, d'une lipase digérant la gaîne aliphatique du bacille de Koch, Metalnikoff a tenté de faire produire au cobaye une lipase similaire en inoculant à cet animal de la cire tuberculeuse. Bien que les résultats—non encore définitifs—semblent plutôt favorables, je ne crois pas que cette méthode puisse servir de base à un traitement curatif de la tuberculose. Ainsi que je l'ai fait ressortir, ce n'est pas la seule présence d'une lipase qui permet à la Galleria de détruire le bacille tuberculeux humain; les leucocytes de cette mite sont en outre en état de résister à l'action nécrosante des endotoxines bacillaires. C'est avant tout à cette propriété de ces leucocytes que la Galleria doit d'être réfractaire à la tuberculose humaine. Eduquer l'organisme à digérer de la cire, c'est déjà quelque chose. Mais, l'immunisation acquise de ce chef sera forcément incomplète tant qu'on n'aura pas rendu les leucocytes de cet organisme réfractaire à l'action nécrosante des bacilles phagocytés.

Auclair a le premier étudié l'effet vaccinant des matières grasses de la gaîne du bacille de Koch soit sur le cobaye neuf, soit sur le cobaye tuberculeux; ses expériences n'ont pas été courronnées de succès. Levenne lui aussi a constaté que chez des lapins auxquels il inoculait les matières grasses de la gaine bacillaire, le pouvoir lipolytique du sérum sur ces graisses n'était pas augmenté. Ce fait ne parle pas en faveur du pouvoir immunisant des substances aliphatiques extraites du bacille tuberculeux. Il y a quelques années, j'ai moi-même essayé de vacciner le cobaye contre la tuberculose humaine en partant de différentes substances aliphatiques constituant la gaîne du corps bacillaire; mais, les résultats obtenus n'ont pas été bien satisfaisants.

Les exotoxines tuberculeuses possèdent-elles un pouvoir immunisant qui permette de les utiliser dans le traitement curatif de la tuberculose? Disons

d'emblée que ces exotoxines dont nous ignorons la nature clinique, ne sont nullement comparables à celles que sécretent le bacille du tétanos ou celui de la diphtérie. Le bacille du tétanos et celui de la diphtérie tuent le malade par intoxication. La spécificité des exotoxines qu'ils sécretent ressort du fait, qu'inoculées à l'animal neuf, ces exotoxines reproduisent les symptômes pathologiques caractéristiques du tétanos ou de la diphtérie. Il en est tout autrement dans la tuberculose dont les exotoxines semblent jouer un rôle plutôt effacé dans l'évolution de l'infection tuberculeuse. J'ai montré (2) qu'on ne pouvait prendre comme type d'exotoxines tuberculeuses la tuberculine de Koch, cette tuberculine contenant en outre de par son mode de préparation des endotoxines extraites des corps bacillaires. J'ai fait voir aussi que les peptones du commerce qui entrent dans la préparation des bouillons de culture usuels exercent sur le cobaye tuberculeux une action toxique appréciable qui s'ajoute à celle des exotoxines tuberculeuses et en modifie l'allure. Afin d'eliminer ces causes perturbatrices, j'ai supprimé de mon bouillon de culture des peptones de commerce et je ne donne aux bacilles de Koch comme aliments albuminoïdes que les dérivés protéïques de la viande de veau. Les exotoxines sécrétés par le bacille tuberculeux dans mon bouillon de culture, inoculés au cobaye neuf, ont une très faible toxicité. Elles sont par contre anaphylactisantes (3) et c'est là leur véritable caractère spécifique. Inoculées à l'homme ou au cobaye tuberculeux, ces exotoxines produisent un effet réactionnel (thermique) bien accusé. A doses plus massives, elles tuent le cobaye tuberculeux, mais leur effet léthal est environ dix dois plus faible que celui de la tuberculine de Koch. En outre leur action vaso-dilatatrice est relativement peu marquée. Les exotoxines tuberculeuses contenues dans mon bouillon de culture ne sont sans doute identiques à celles qui sont sécrétées par le bacille de Koch dans l'organisme humain. Et cependant mes exotoxines artificielles et les exotoxines produits in vivo ont les mêmes propriétés générales; elles sont toutes deux fort peu toxiques pour l'animal neuf et anaphylactisantes. Il ressort en effet des expériences de Heymans en Belgique et de Moussu en France que des animaux neufs porteurs de cultures tuberculeuses enfermées dans des sacs de collodion ou dans des bougies Chamberland ne semble pas souffrir de cet état de choses. Les exotoxines sécretées in vivo ne paraissent pas altérer l'état de santé de ces animaux, par contre elles sensibilisent l'organisme puisque un mois après l'introduction de ces cultures in vivo, l'animal réagit à la tuberculine. (Moussu.) Cette méthode de cultures in vivo a même été utilisée comme procédé de vaccination antituberculeuse. D'après Heymans, les résultats de cette vaccination seraient excellents. Moussu est moins optimiste. D'après ce savant, la résistance donnée aux animaux par ces cultures in vivo ne se traduirait que par une évolution plus lente de la tuberculose expérimentale. Les expériences que j'ai faites avec les exotoxines de

mon bouillon de culture m'ont conduit aux mêmes conslusions. Au point de vue curatif, les cobayes traités par ces exotoxines ont une survie moyenne plus longue que les cobayes témoins. Il est du reste très difficile d'opérer avec les exotoxines seulement, car pendant la période de culture des bacilles meurent et laissent diffuser par macération, de leurs endotoxines dans le bouillon nutritif.

Les exotoxines à elles seules, ont un pouvoir immunisant trop faible, pour servir de base à un traitement curatif de la tuberculose. Cela n'a rien qui doive nous surprendre, étant donné le rôle plutôt secondaire que ces toxines jouent dans l'evolution de l'infection tuberculeuse.

Il me reste à étudier des endotoxines dont l'importance est capitale car elles representent l'arme la plus redoutable du bacille de Koch. Ce sont elles qui paralysent les moyens de défense de l'organisme et qui permettent à l'infection tuberculeuse de gagner du terrain. Les endotoxines comprennent les substances albuminoïdes, nucléines et protéines, qui constituent le corps du bacille de Koch—la gaïne aliphatique mise à part. Je ne mentionnerai pas toutes les endotoxines qui ont été dejà retirées du corps bacillaire, car elles n'ont pas toutes un égal pouvoir immunisant. Plusieurs d'entre elles semblent être plutôt des produits d'hydrolyse que des endotoxines vraies.

On sait que les nucléines sont un des constituants importants du bacille tuberculeux. Il était naturel de se demander si ces nucléines fonctionneraient comme vaccin. Behring, Römer et Ruppel (4) ont montré que la tuberculo-nucléine ainsi que ses dérivés n'ont pas un pouvoir immunisant supérieure à celui de l'ancienne tuberculine de Koch. J'avais fait aussi des expériences dans cette même direction mais sans plus de succès que les auteurs précédents. Persuadé de l'existence de substances immunisantes dans le corps bacillaire, je me suis appliqué à extraire du bacille d'autres endotoxines que la tuberculo-nucléine. Après de nombreux tatonnements, je me suis arrêté, comme procédé d'extraction, à l'acide orthophosphorique à 1%. L'endotoxine extraite par ce procédé est une acidalbumine qui précipite lors de la neutralisation de la solution phosphorique par la soude normale. A l'état sec, cette albumine a une consistance cornée et une coloration brune. Elle est insoluble dans l'eau et se dissout lentement dans les alcalis et les acides étendus. Elle est précipitée par les solutions salines neutres (sulfate d'ammoniaque, sulfate de magnesie, chlorure de sodium), par les acides minéraux concentrés, par l'alcool, etc. Par l'ensemble de ces réactions chimiques cette endotoxine appartient aux substances albuminoïdes proprement dites. L'acide ortohphosphorique à 1% n'extrait du bacille tuberculeux qu'une faible partie des protéines constituant le corps bacillaire. J'étudie en ce moment la question de savoir, si je ne puis pas extraire par d'autres procédés des endotoxines qui renforceraient l'action immunisante

de mon acidalbumine; mes recherches ne sont pas encore assez avancées pour que j'en parle en ce moment.

L'extrait bacillaire par l'acide phosphorique à 1% exerce sur le bacille de Koch une action bactéricide energique. En mélangeant à cet extrait une émulsion de bacilles de Koch et en inoculant, après trois jours de contact, ce mélange à des cobayes neufs, on voit se former au point d'inoculation une eschare qui ne tarde pas à guérir; mais, la tuberculose n'évolue pas. Cet extrait tue donc le bacille de Koch in vitro. Même dilué au $\frac{1}{20}$, cet extrait mélangé à une émulsion bacillaire, exerce encore une action bactéricide incontestable bien qu'attenuée. Après inoculation de mélange à des cobayes neufs on constate que la tuberculose évolue beaucoup plus lentement que chez les cobayes témoins. (5) Cette action bactéricide est due essentiellement au solvant, c'est-à-dire à l'acide orthophosphorique. Elle dépend cependant en partie de l'endotoxine elle-même car l'attenuation de la virulence du bacille de Koch est moins prononcée si on utilise au lieu de l'extrait bacillaire complet, simplement de l'acide orthophosphorique à 1%.

L'endotoxine que je retire du corps bacillaire est beaucoup plus toxique que l'exotoxine sécrétée dans mon bouillon de culture. Elle est aussi plus anaphylactisante et tue le cobaye tuberculeux à la dose d'environ 0 gr. 05 d'endotoxine sèche. Elle produit la nécrose des leucocytes. Mon endotoxine ne rentre pas dans la même catégorie que les endotoxines de la tuberculine de Koch ou les toxoprotéines de Maragliano qui sont solubles dans l'eau ou dans l'eau glycérinée. En effet des bacilles tuberculeux épuisés à chaud par l'eau ou par l'eau glycérinée, puis traités par l'acide orthophosphorique à 1% fournissent la même acidalbumine que les bacilles neufs. Mon endotoxine a un pouvoir immunisant plus accusé que celui de mon exotoxine. Elle renforce davantage la résistance des cobayes à la tuberculose expérimentale. Cette dernière évolue plus lentement, mais n'a jamais été définitivement enrayée.

Afin d'utiliser les propriétés immunisantes des toxines tuberculeuses dans leur ensemble, j'ai mélangé à volumes égaux les exotoxines de mon bouillon de culture et l'endotoxine de mon extrait bacillaire par l'acide orthophosphorique à 1%. C'est ce mélangé qui constitue ma tuberculine. Inoculée au cobaye neuf ma tuberculine se montre peu toxique puisqu'elle ne le tue pas à la dose de 10 cc. en injection sous-cutanée. Par contre, elle tue sûrement un cobaye tuberculeux du poids de 700 à 1000 grammes à la dose de 1 cc. et cela en moins de 24 heures. Inoculée à doses faibles, ma tuberculine produit chex le cobaye tuberculeux un effet réactionnel ou thermique. L'homme tuberculeux est très sensible à l'effet réactionnel de ma tuberculine et réagit souvent à l'inoculation de 0 cc. 000001 et même à des doses plus faibles encore.

Ma tuberculine a un pouvoir immunisant incontestable qui ne va pas cep-

endant jusqu'à preserver le cobaye contre la tuberculose expérimentale. Inoculée préventivement ou curativement ma tuberculine augmente la résistance du cobaye à l'infection tuberculeuse; cette vaccination relative se traduira par une survie des animaux traités dépassant d'un an et plus, dans les cas très favorables, celle de témoins. (6).

Les différentes tuberculines qui ont été préconisées jusqu'à ce jour ne sont pas identiques les unes aux autres. Elles sont forcément de même famille puisqu'elles partent toutes du bacille de Koch, mais les toxines qu'elles contiennent diffèrent d'une tuberculine à l'autre suivant les procédés de culture et suivant les procédés d'extraction des endotoxines bacillaires. Toutes les tuberculines renferment des substances immunisantes, bien qu'elles ne contiennent pas toutes les mêmes toxines; c'est à la diversité de leur composition qu'il faut attribuer le fait que des malades supportant des fortes doses d'une tuberculine réagiront malgré cela, à l'inoculation des faibles doses d'une autre tuberculine. Quant à ma tuberculine, elle est préparée comme je l'ai dit, avec des exotoxines sécrétées dans un bouillln de culture particulier et avec une endotoxine spéciale extraite du bacille de Koch. Inoculée au cobaye, cette tuberculine accroit la résistance de cet animal à la tuberculose expérimentale; elle a donc des propriétés immunisantes qui justifient son emploi dans la thérapeutique humaine.

De l'exposé que je viens de faire, il ressort que l'on peut retirer du bacille tuberculeux des toxines qui serveront de base à un traitement curatif spécifique de la tuberculose. Ces toxines sont très maniables parcequ'elles sont relativement peu toxiques; elles sont dosables non d'une manière absolue il est vrai, mais d'une manière relative ce qui est bien suffisant dans la pratique. N'oublions pas que nous nous trouvons en présence de conditions toutes spéciales. Il ne s'agit pas en effet d'immuniser un organisme neuf, mais d'enrayer une infection tuberculeuse déjà existante. Livrés à eux-mêmes, les moyens de défense de cet organisme sont impuissants à lutter contre l'infection; ils sont incapables de détruire les bacilles qui se multiplient dans les foyers tuberculeux. C'est à relever ces moyens de défence qu'il nous faut viser. Nous devons chercher à renforcer la résistance des leucocytes à l'action nécrosante du bacille de Koch, tout en stimulant le pouvoir bactériolytique de ces leucocytes. Nous devons en même temps provoquer chez le malade la formation d'anticorps qui sensibilisent le bacille de Koch et en rendent plus facile la destruction par les leucocytes. Les toxines (exotoxines et endotoxines) contenues dans ma tuberculine remplissent-elles ces conditions auxquelles tout traitement spécifique de la tuberculose doit satisfaire? Expérimentalement il est très facile de constater que ma tuberculine provoque la formation d'anticorps. J'ai montré que, inoculée à l'animal neuf, cette tuberculine détermine dans le sérum l'apparition de précipitine, d'agglutinine et de sensibilisatrice spécifiques. Mais, en est-il de même chez l'homme tuberculeux? Oui. Après un certain temps de

traitement par une tuberculine on constate dans le sérum du tuberculeux, la présence des mêmes anticorps que chez l'animal neuf. Les inoculations de ma tuberculine sont suivies de la production d'une sensibilisatrice qui diminue la virulence du bacille de Koch et rend ce bacille moins nocif pour l'organisme. Mélangeons une émulsion de bacilles tuberculeux au sérum d'un animal traité par ma tuberculine, puis après un contact d'une quinzaine d'heures, centrifugeons le mélange, lavons les bacilles et inoculons les au cobaye. La tuberculose évoluera, mais plus lentement que chez les témoins. En outre, chez les animaux traités, les leucocytes paraissent mieux résister à l'action nécrosante du bacille de Koch et leur fonction bactériolytique semble renforcée; car, sur des préparations de pus tuberculeux les bacilles sont généralement plus granuleux et plus dégénérés, ils se colorent aussi moins bien. L'index opsonique se relève. Ces faits ne s'observent, il va sans dire, que chez les malades dont la tuberculose est favorablement influencé par les inoculations de ma tuberculine. Comme on le voit, l'action curative de ma tuberculine se manifeste en renforçant la résistance des leucocytes à l'action nécrosante des bacilles, en sensibilisant ces derniers et en stimulant la production d'anticorps spécifiques. Ce mode d'action m'autorise à conclure que les toxines contenues dans ma tuberculine ne sont certainement pas les mêmes que celles qui sont sécretées par le bacille de Koch in vivo, c'est-à-dire dans le corps du malade. Elles appartiennent—il va de soi—à la même famille que ces toxines naturelles, mais ne sont pas identiques à elles. Car pourquoi les toxines de ma tuberculine auraient-elles la propriété de fonctionner comme vaccin, alors que les toxines naturelles sécrétées in vivo ne joueraient pas de cette même propriété? En admettant l'identité de ces deux catégories de toxines, il serait en outre difficile d'expliquer comment, dans les cas favorablement influencés par elle, ma tuberculine inoculée à des malades fébriles produit une défervescence de la fièvre et même la température à la normale.

Pour réaliser son action curative, le traitement de la tuberculose par ma tuberculine doit être soumis à certaines règles. Puisque ma tuberculine ne peut agir qu'en éduquant les leucocytes et qu'en provoquant la formation d'anticorps, l'efficacité du traitement n'est donc pas liée à la quantité absolue de tuberculine que l'on inoculera dans le cours de la cure. Il ne faut pas viser à inoculer le plus de tuberculine possible; il importe, avant tout, de déterminer quelles sont les doses capables de stimuler les moyens de défense de l'organisme infecté. Ces doses utiles varieront d'un malade à l'autre et cela dans les limites assez étendues. Pour les uns, l'action stimulante de ma tuberculine se manifestera déjà à l'inoculation de solutions très faibles; pour d'autres, elle se manifestera seulement à l'inoculation de solutions moyennes ou fortes ($\frac{A}{2}$; A; B; C; etc.). On ne doit pas perdre de vue qu'on se trouve en présence d'un organisme sensibilisé par la tuberculose; aussi augmentera-t-on les doses avec prudence afin de ne pas produire

des réactions thermiques ou autres qui sont inutiles ou même dangereuses. Même chez les malades afébriles on débutera par l'inoculation de doses pour ainsi dire homéopathiques répondant à 1-20 de cc. des solutions $\frac{A}{128}; \frac{A}{64}$. Les règles du traitement de la tuberculose par ma tuberculine ont été magistralement exposés par le Professeur Sahli dans sa brochure "Ueber Tuberkulinbehandlung" (7) brochure à laquelle je renvoie le lecteur désireux d'étudier cette question plus à fond.

La technique des injections de ma tuberculine varie suivant les localisations tuberculeuses. Dans les formes médicales de la tuberculose (pulmonaire, rénale, etc.) on ne peut utiliser que les injections hypodermiques. Dans les formes chirurgicales de la tuberculose il est avantageux de faire des injections intrafocales, que l'on peut compléter s'il y a lieu par des injections hypodermiques (8).

Ma tuberculine intervenant chez le tuberculeux comme un stimulant spécifique de moyens de défense déjà plus ou moins compromis par la maladie, son action curative est forcément limitée. Il est toujours aléatoire de tenter une immunisation active dans le cours même de la maladie et si la chose est faisable cela tient à ce que l'infection tuberculeuse suit en général une évolution de longue durée. A supposer—au moment où l'on institue le traitement—que les moyens de défense du malade soient déjà trop inhibés pour pouvoir répondre à l'action stimulante de la tuberculine, l'effet thérapeutique sera nul. C'est pourquoi, il est de toute nécessité de ne pas attendre avant de recouvrir à ce mode de traitement que la tuberculose ait accompli son oeuvre de destruction des tissus et d'intoxication de l'organisme.

1. Weber et Titze: "Die Immunisierung der Rindern gegen Tuberkulose," Tuberk. Arb. a. d. k. Gesundheitsamte, 1907.
2. Ed. Béraneck: "Une nouvelle Tuberculine," Revue médicale de la Suisse romande, octobre 1905.
3. Ed. Béraneck: "La Tuberculine Béraneck et son mode d'action," Revue médicale de la Suisse romande, juin 1907.
4. Behring, Römer, Ruppel: "Beiträge zur experimentellen Therapie," Tuberkulose, Marburg, 1902.
5. Ed. Béraneck: Congrès international de la Tuberculose, Paris, 1905.
6. Voir mes travaux déjà cités.
7. Prof. Dr. Sahli: "Ueber Tuberkulinbehandlung," Zweite Auflage.
8. Ed. Béraneck: Congrès de Paris 1905, et Dr. de Coulon. Revue médicale de la Suisse romande, 1907.

The Treatment of Tuberculosis by Tuberculins and More Especially by Béraneck's Tuberculin.—(BÉRANECK.)

Antituberculous immunization has, up to the present time, given only relative results. These results, however, are sufficient to enable us to affirm that homotypical or heterotypical tubercle bacilli are capable of conferring upon inoculated animals marked resistance to experimental or natural tuberculosis. The difficulties encountered in these attempts at

vaccination are due to the biochemical character of Koch's bacillus. Although Koch's bacillus may act as a vaccine, it cannot be used in its natural state in the treatment of a patient with tuberculosis. Under these circumstances it is necessary to make use either of the toxins secreted by this bacillus in the culture medium, or of the toxins constituting the body itself of this bacillus.

Effect of the aliphatic toxins forming the capsule of fatty substances which envelops the tubercle bacilli.

Effect of the exotoxins secreted in the culture media.

Effect of the endotoxins extracted from the bacillary body.

Do the immunizing properties of the tuberculous toxins justify the utilization of these toxins in a specific treatment of tuberculosis? Yes.

The different tuberculins are not identical with one another.

Composition of Béraneck's tuberculin. Its mode of action upon the healthy animal and upon the tuberculous animal. Object of the treatment of tuberculosis by Béraneck's tuberculin and general rules deduced therefrom, concerning the method of administration of this tuberculin.

El Tratamiento de la Tuberculosis por Medio de le Tuberculina. y mas Especialmente por la Tuberculina de Béraneck.—(BÉRANECK.)

La inmunisación anti-tuberculosa no ha dado hasta el presente sino resultados relativos. Estos resultados sinembargo son suficientes para afirmar que el bacilo de la tuberculosis, de cualquer tipo que sea, es capaz de producir en los animales inoculados, una resistencia marcada contra la tuberculosis experimental ó natural. Las dificultades que se encuentran en los ensayos de la vacunación son debidas a los caracteres bioquímicos del bacilo de Koch.

Aunque el bacilo de Koch pudiese funcionar como una vacuna, uno no puede empleado en el tratamiento de las personas afectadas de tuberculosis. En este caso es necesario recurir, bien al empleo de la toxina producidas por el bacilo en los medios de cultura ó bien à la toxina contenida en el cuerpo mismo del bacilo.

Efecto de la toxina que se encuentra en la vaina grasosa que forma la cubierta del bacilo de la tuberculosis.

Efecto de las toxinas secretadas por el bacilo en los medios de cultura.

Efecto de las endo-toxinas extraidas del cuerpo del bacilo.

Las propiedades inmunisadoras de las toxinas justifican el empleo de estas toxinas en el tratamiento de la tuberculosis? Si.

Las diferentes tuberculinas no son identicas les unas á las otras.

Composición de la tuberculina de Béraneck. Modo de acción de esta sobre los animales buenos y los animales tuberculosis. Objeto del tratamiento de la tuberculosis por medio de la tuberculina de Beraneck y reglas generales que deben observarse, en cuanto al modo de empleo de esta tuberculina.

THE VALUE AND PRACTICABILITY OF THE USE OF TUBERCULIN IN PULMONARY TUBERCULOSIS.

By Professor Dr. K. Hammer,
Heidelberg.

The treatment of tuberculosis of the lungs with tuberculin has attained but slight popularity among physicians and laymen up to the present time. This fact must appear the more striking as the need of a specific and, above all, an efficient remedy against this disease, which decimates all peoples of the earth, is certainly very great. Why this remedy receives so little confidence is plain.

When Robert Koch, in 1890, announced his sensational discovery of a specific remedy against tuberculosis, physicians, as well as the people, held such high hopes of it that they could not possibly be realized, for most likely a remedy that will cure a patient in the last stages of phthisis will never be found. However, it was a great disappointment, at that epoch of uncritical application of tuberculin, that it did not succeed. Since the most advanced and serious cases of tuberculosis were the first to be treated by injections of the new remedy, was it remarkable that these patients got worse instead of better, suffered from disagreeable and often dangerous complications, and that bitter disappointment followed? This failure of the first tuberculin era seems easy enough to understand now that we no longer hold out fantastic hopes; for we know that, at that time, the dosages as well as the methods of application were not sufficiently understood.

Koch had declared that healing would take place only in the early stage of consumption, so that if only incipient or mild cases of the disease had been treated, the disappointment would not have been so great. The good results would then have overbalanced the bad, and tuberculin would not have fallen into such disrepute as it did.

In the case of tuberculin it is evident how much more difficult it is to regain the confidence lost in a remedy than to introduce a new one. Although, in the course of the last ten years, many voices were raised in favor of the use of tuberculin, the remedy has not regained its position, and we cannot succeed in making its use universal. Only when this is done, however, can we judge the value of a remedy against the spreading of tuberculosis. So long as we have no better substitute, we must consider it of the greatest

importance that we bring about a general use of tuberculin. To this end it is necessary that every physician acquaint himself with the mode of employment, the dosage, and the technic of the remedy. At present, this desired end, at least in Germany, has not been attained. I think it is, therefore, an urgent and gratifying task for us to make known, by word and letter, the method of treatment to wider circles.

Koch points out, in his first publication, that the principal factor for success is the application of his treatment in the earliest stage of the disease. It is this period that is the real sphere of the remedy, for only then can it produce its best effect. We go further to-day, and assert that the cure should be adopted when there is only a suspicion of beginning tuberculosis, and before any manifest signs of the disease have appeared.

But if we ask for so general a use of tuberculin, we must, on the other hand, be able to assure ourselves that the treatment can be carried out without harm to the patient. After more than ten years of experience on abundant material I do not hesitate to declare that the treatment can be carried out in all cases—even the most serious and advanced—without danger. The first demand on a doctor's work—the "nihil nocere"—can be put to the test with certainty.

I have studied the tuberculin literature of my own and other countries with reference to the diagnostic importance of Koch's method, and have concluded that the untoward results obtained were due not to the remedy itself, but to its incorrect application. Since the dosage of the medicine and the entire technic of the treatment have been studied more exactly, only a few cases of ill success have been reported, and even these can be traced to faulty administration, or to the fact that the cases were such that it is difficult to decide whether the harm was effected post or propter hoc.

With the manifold forms of tuberculosis, it has often happened, even before anything was known of tuberculin, that an apparently favorable case ended fatally, just as a case with unfavorable prognosis often shows a tendency toward recovery, and even ends in perfect restoration. In my experience with this treatment I have not seen a single case in which an unfavorable result could be traced to the use of tuberculin, and similar results have been reported by others of wide experience. It is true that I have seen many serious reactions follow, especially when I began giving tuberculin, as I still used relatively large doses, and do so now when I give the diagnostic injections where larger doses must be taken. I have never, however, seen lasting harm result, in spite of the fact that I have often given the remedy in quite hopeless cases, where I wished to ameliorate certain symptoms.

Since the first tuberculin era, the fear of activating the tubercle bacilli and their generalization in the organism by the influence of tuberculin always reappears,—*i. e.*, the ghost of miliary tuberculosis,—a possibility we

cannot deny theoretically, considering the influence of the tuberculin on the tuberculous tissues.

If this possibility must be admitted, we must state that this accident happened even in the first tuberculin period, when the remedy was often used in too large doses and in quite distressing cases—seldom, considering the large number of cases treated with it; and that now, with the improved technic of the treatment, its occurrence is unknown. Admitting, however, that it might rarely happen, would that be a reason for absolutely condemning the tuberculin treatment, supposing that, in many other cases, it would produce obvious benefit? Do we renounce the use of narcotics, even for minor operations or for diagnostic purposes, because we know that a fatal result might follow, though, fortunately, only as an exception?

If the tuberculin treatment is to be generally adopted, it is necessary that the method be practised in an ambulatory way, as we cannot expect mildly affected consumptives to enter a hospital and undergo a treatment of prolonged duration. Besides, there would not be enough hospitals, sanatoriums, and other institutions to receive them all. Still less would a patient with only a suspicion of tuberculosis be willing to remain in a hospital for a long time. Unless the patient's condition is so serious as to demand it, a prolonged sojourn in a hospital is unnecessary for the proper carrying out of the tuberculin cure; on the contrary, the much dreaded remedy of Koch can be used in so cautious a way, without diminishing its effect, that all harm can be avoided even with ambulatory treatment. Generally, there need be no, or but temporary, interference with the patient's business.

The first condition for the carrying out of the cure is a careful observation of temperature. This should, preferably, be taken every two hours, except in ambulatory cases, in which the records would most likely not be accurate. It is best, therefore, to take the temperature four times a day—at about eight, twelve, four, and eight o'clock. These four-hourly observations are just sufficient to demonstrate the exact course of the temperature.

Most of my patients were treated with tuberculin at the Heidelberg Medical Polyclinic, and belonged to the laboring classes. These patients were instructed to take their temperature themselves. Further, it is advisable for the nurse to note the temperature from time to time. In this way we always succeed in obtaining a comparable temperature curve. The temperature should carefully be observed for some weeks before the first injection of tuberculin, so as to obtain an exact record of its course when uninfluenced by the remedy. This and the general condition of the case enable us to estimate the size of the dose to be given, which is the most important point of the tuberculin treatment and the one that influences largely the beneficial or the injurious effects of the remedy. Second, it is of great importance that the administering physician be able and experienced

enough to recognize the reactions, however slight, caused by the injection. The recognition especially of the slightest signs of reaction of a subjective or an objective nature will be the best protection against danger. Whereas during the first tuberculin period a strong reaction was considered the essential point and was regarded as the healing factor, we now try to avoid, as much as possible, any strong reaction, as experience has shown that it is not necessary in order to secure the healing effect of the tuberculin.

As to the size of the doses to be injected during the tuberculin treatment, I would state the following:

The most important task consists in finding the limit of the reaction, *i. e.*, to inject the largest possible dose that can be given without bringing about the reaction, and to keep to this limit during the whole course of treatment. In this way the remedy produces its best effect, and the reactions, which are the most likely to cause harm, are avoided. The limits of reaction vary in individual cases—in one case it can be attained with quite a small dose, whereas in another it is brought about only by a relatively large one. The dosage will, therefore, depend upon the character of each special case, and must differ according as the case is old or recent, with fever or without, whether the tuberculous process is local or diffuse, whether other organs than the lungs are affected, or whether other diseases complicate the tuberculosis of the lungs.

I will restrict myself to discussing the use of the old tuberculin and the new tuberculin, or the bacillus emulsion. The first dose of old tuberculin varies from 0.00000001 to 0.00001 mgm. The usual initial doses are 0.0000001, or $\frac{1}{10000}$ mgm., and 0.000001, or $\frac{1}{1000}$ mgm. This dosage deviates greatly from Koch's prescription, who advises giving 0.0001 mgm. as the first dose; the former is the more cautious way and leads to as good, or even better, results. As a rule, one need not give less than $\frac{1}{10000}$ mgm., but it often happens that, in serious cases, the quantity can be increased only very slowly, and the same dose must often be repeated. A dosage higher than $\frac{1}{100}$ mgm. is not to be recommended, even in the most favorable cases; generally it is too large, even in these cases, and it is better to be more cautious and begin with $\frac{1}{1000}$ or $\frac{1}{10000}$ mgm. in all instances. That these small doses of 0.00000001 are not homeopathic—*i. e.*, ineffective—ones has been shown by the fact that reactions have been caused, though rarely, even by these minute doses.

Although the production of the dilution used for the injections of old tuberculin is very simple, and therefore requires no further comment, the doses contained in the dilution of the bacillen emulsion must be figured out with regard to the effective substance contained by the preparation.

The new tuberculin, which presents a suspension of pulverized tubercle bacilli in water, with glycerin, contains, in 1 c.c., 0.005 gm. of pulverized

tubercle bacilli, or 5 mgm. of the effective substance. As to Koch's prescription, we begin with 0.0025 mgm. of the bacillus substance; that is, with $\frac{1}{2000}$ part of 1 c.c. of the preparation. The dilution of the preparation is effected in the following way:

From an original bottle 0.1 c.c. is taken with a 1 c.c. glass tube divided into 100 equal parts; 9.9 c.c. 0.8 per cent. salt solution are then added (5 per cent. phenol solution if the dilution is to be preserved for several days). This 100-fold dilution contains in 1 c.c. 0.05 mgm. of bacillus substance. To 1 c.c. of this 100-fold dilution must be added 9 c.c. of 0.8 per cent. salt solution, bringing the whole amount up to 10 c.c. This last 1000-fold dilution contains in 0.5 c.c. 0.0025 mgm. of bacillus substance—the initial dose prescribed by Koch. This dosage, like that given by Koch for the old tuberculin, is much too large for the initial dose, and I would strongly recommend working with much smaller quantities.

We prepare the dilution of the new tuberculin in the following manner:

From the original solution, which contains, in 1 c.c. of bacillus emulsion, 5 mgm. of pulverized effective bacillus substance, five dilutions are prepared. Their content of effective substance can best be shown by the following table:

Dilution.	Solution.	Effective Substance.	
		In the c.c.	In 0.01 c.c.
I = 10-fold.	1 : 9.	0.5 mgm.	0.05 mgm.
II = 100-fold.	0.1 : 10. (Dil. I, 1 c.c. + 9 c.c. water.)	0.05 mgm.	0.005 mgm.
III = 1000-fold.	0.01 : 10. (Dil. II, 1 c.c. + 9 c.c. water.)	0.005 mgm.	0.0005 mgm.
IV = 10,000-fold.	0.001 : 10. (Dil. III, 1 c.c. + 9 c.c. water.)	0.0005 mgm.	0.00005 mgm.
V = 100,000-fold.	0.0001 : 10. (Dil. IV, 1 c.c. + 9 c.c. water.)	0.00005 mgm.	0.000005 mgm.

In $\frac{1}{10}$ c.c. of the dilution there are 0.000005 mgm., or 0.000000005 gr., of the effective substance. This seems to be an exceedingly small dose, but it is strong enough occasionally to bring about reactions, a fact that shows the efficiency of this small dose. Our usual initial dose of dilution V is $\frac{1}{10}$ c.c., or 0.000005 mgm. Moreover, what has been said regarding the old tuberculin can be applied to the new tuberculin, namely, that the initial dose can be varied according to the case. In general, it is well to begin with rather weak doses and to go on cautiously to the limit of reaction. To as-

certain this limit should be the doctor's next task, after determining the initial dose. While we can go on increasing the dose a little more quickly until we have reached this limit, the greatest caution is needed as soon as we have arrived at this limit.

The increase in dosage must be governed by all the signs of reaction. The most important factor is the temperature curve. Even the slightest change must be taken into consideration. Very often the injections regulate the temperature to the extent that the varying curves, which showed considerable remissions, become more even, with less fluctuations, or that the temperature falls altogether. One may not consider this fact in the strict sense of a reaction, but as a sign that the tuberculin is effective. It permits a gradual increase in the dosage.

Should the temperature rise, if only by tenths, this must be considered a sign of reaction, although there be no other symptoms of it. Then the dose should not be increased for some time, but the same dose may be repeated, or we may return to a smaller dose, and, above all, we should allow a longer interval of time—up to a fortnight—to elapse before the next injection. The reaction must have subsided as much as possible before.

If the temperature rises after an injection, the increase of dosage must be done cautiously. A number of other objective signs of reaction, which may happen without influencing the temperature, demand urgent attention; for example, an inclination to coughing, increased cough, amelioration or disappearance of a chronic cough, increased expectoration, change in the expectoration, pains in the limbs, headache, pains in the chest or stomach, insomnia, constipation or diarrhea, urinary retention or polyuria, swelling of liver or spleen, want of appetite or increased appetite, vomiting, sickness, night-sweats or their disappearance, etc. I have given here only the most important and frequent signs, and cannot enter into particulars about their significance. I shall only point out that these symptoms, and all small and insignificant changes in the patient's condition, require the greatest attention, and are factors to be considered in regulating the dosage. Pains felt only at the site of injection, or radiating therefrom to the surrounding parts, are not generally signs of reaction, and may, therefore, be neglected.

The limit of dosage to produce a therapeutic effect naturally varies according to the case. In general, it must be considered desirable that the highest possible dose be attained. In consequence the whole treatment should last as long as possible, so that the quantity of tuberculin used during the treatment may be a very large one. If it can be managed, we increase the dose up to 1 gm. of pure old tuberculin, or to 0.02 of the bacillus substance of the bacillus emulsion. It is unnecessary, however, in every case, to rise to so high a dose. The treatment recommended by Petruschky, called the "Etappenkur," is especially appropriate for mild cases and for prophylaxis.

Petruschky rises to 0.01 old tuberculin, and then, after an interval of six months or a year, repeats the same treatment several times. This method is to be recommended in appropriate cases.

The question as to the interval that should elapse between the injections cannot be answered in a general way. As a rule, it is better if the injections do not follow each other too closely. Four or five clear days ought to elapse between each injection, so that we will not overlook a reaction that may set in late, and, above all, in order to give the remedy time to produce its full effect. On an average, it will be practical to give the injections weekly. If the limit of reaction is reached, and the distinct effect of the tuberculin is evident, the injections may be administered only every fortnight. Naturally, the cure is prolonged in this way, but this is not detrimental to the patients, who sometimes lose patience and ask that the injections be given more frequently. The entire quantity of pure old tuberculin that is used, on an average, for a complete cure, varies from 4 to 6 gr.; it amounts, certainly, to less if the "Etappenkur" is adopted, but it may come to much more if one can increase but slowly and must often repeat the same dose. The largest quantity that I injected in a continuous cure was 13.5852 gr.

The pure tuberculin can be preserved in a dark place for any length of time. The dilutions are less durable in proportion to the weakness of the solutions. It is advisable, therefore, to renew the solutions about every fortnight.

Whether there are any differences, and in what they consist, between the effect of the old tuberculin and that of the bacillus emulsion is still an open question. In my opinion, there are no essential differences between the two remedies, but, in general, I prefer the old tuberculin. I have often seen good results, *e. g.*, reduction in temperature of feverish tuberculosis cases, follow the use of the new tuberculin.

The technic of the injection is so simple that we need only refer to it briefly. Any syringe of 1 c.c. content may be utilized, if it can be disinfected and is graduated in tenths, or, better still, in twentieths. The "Record Syringe" is to be recommended for this purpose.

The injections are best given in the back, in the regio supra spinata. A rapid and strong disinfection with alcohol or alcohol and ether is sufficient. The site of the injection is covered up for a short time by cotton-wool, held in place with adhesive plaster. In that way abscesses have, in spite of the large number of injections that have been administered, always been avoided. Not infrequently pains occur in consequence of the injection; these sometimes spread from the injected spot to more distant regions. The pains may be violent, and, subjectively, very disagreeable, but have not the significance of a reaction. On the other hand, we often see swellings of the lymphatic glands, which are very sensitive to the touch. These swellings have, in my

opinion, the significance of a reaction, as it must be supposed that these glands very probably contain a tuberculous germ, but whether they are a sign of an active tuberculous process in the body is uncertain.

The question as to what cases of tuberculosis are suitable for treatment with tuberculin, and under what conditions the selection of the cases suitable for the specific treatment should be effected, is a very important one. My point of view differs from that of most authors on this subject. I do not think it necessary that a special selection should be made, but I believe that all tuberculous diseases can be treated with tuberculin. There is so little danger in the specific remedy, if properly administered, that it may be given even in the most serious affections, and it is also of great benefit in combating some of the symptoms of consumption in those cases where recovery is hopeless.

If we have to do with cases in the last stages, tuberculin will not be able to produce a lasting reduction in the fever; a favorable influence will, however, often be noticeable, and, in moderately serious cases, with slight fever, and in those in the second and third stages, a slow and constant remittance of the fever can be attained.

The troublesome night-sweats of the consumptive will often be influenced favorably by the tuberculin; an irksome cough can be improved or made to disappear entirely; a tough sputum, hard to expectorate, will become thinner and easy to discharge; and, eventually, the quantity of sputum may be diminished. The pains that frequently torment the tuberculous patient may disappear. The appetite often increases, and we cannot deny that, frequently, the power of resistance of the whole organism of the severely afflicted consumptive is animated and augmented.

If there is no doubt that, even in far-advanced cases, certain ameliorations may be produced, it also frequently happens that no perceptible effects follow the use of the remedy. It must be admitted that certain symptoms, such as night-sweats, increased coughing, pains, etc., may develop in consequence of the treatment. This is usually due to the fact that the dose may have been too large, and these effects will, as a rule, disappear when the right dose is administered.

The principal domain for the remedy should be, according to Koch's original prescription, the cases in the first stage of tuberculosis of the lungs. In this stage the prospects of recovery are good. But cases in the second and third stages (according to Turban's classification) are not to be considered unpromising, and one is often surprised by the results attained in these relatively far-advanced cases by Koch's remedy alone, exclusive of all other treatment.

Many examples could be cited to bear out these assertions. A very important domain for the application of tuberculin is formed by the numerous

prophylactics. Every physician knows how difficult the diagnosis of an incipient tuberculosis is, and how often we must content ourselves with pronouncing that only a suspicion of a tuberculous condition exists.

The tuberculin injections used for diagnostic purposes—the cutaneous as well as the ophthalmo-reaction—are, in my opinion, either too strong or not perfect enough to show us with certainty an active tuberculosis—that is, a tuberculosis demanding treatment.

So long as our ability to diagnose tuberculosis is not so far advanced that we can form our diagnosis with certainty, either by the help of diagnostic tuberculin methods or by the serodiagnosis, it will be rational to treat the patients suspected of an incipient tuberculosis with tuberculin; all the more so as no harm can be done if it is properly administered. However, I want to point out that in these quite mild cases, also, the greatest caution in the dosage is necessary.

Although the tuberculin has been described as a precious and successful remedy for the treatment of tuberculosis, the value of the hitherto well-tested methods, above all, the climatic and dietary methods, should not be underrated. On the contrary, it will be especially useful to combine the old, well-proved methods of treatment,—above all, the climatic and dietary cure,—which succeed, to a great extent, in combating the symptoms of consumption with the tuberculin treatment. I consider this combination at present as the ideal method of treating tuberculosis. In fact, the results of the German sanatoriums have much improved with the increased use of tuberculin.

Gentlemen, I want to break a lance before the forum of the International Congress on Tuberculosis in favor of tuberculin and for its extensive use in practice. This communication will have attained its end if it helps to regain the lost confidence of physicians and the uninitiated in tuberculin. As an important achievement, the fact should be pointed out that tuberculin, properly and carefully administered, can surely do no harm. As a first condition for its harmless use, it is certainly necessary that the physician who desires to add it to his therapeutic equipment must be experienced enough to be able to judge even the smallest sign of a reaction.

If, under this supposition, the physician records his experiences of the treatment of his tuberculous patients with the remedy, I do not doubt that they will show favorable results. Naturally, the expectations may not be too high, and one may not ask too much of any remedy against tuberculosis.

If we take into consideration that tuberculosis is a very slowly developing disease; that it is often secretly working for many years in the organism and has taken a strong hold before there are any manifest signs of it, and that the extent of the involvement is, in many cases, much greater than might be expected, judging from our diagnostic methods, then we can scarcely expect better results than those effected by tuberculin.

Naturally, there will be cases where even the tuberculin will be of no avail, and we must always hope to find a remedy still more effective; but, until this is found, the use of tuberculin will always prove a strong weapon in the combat against tuberculosis.

El Valor y la Practicabilidad del Uso de la Tuberculina en la Tuberculosis Pulmonar.—(HAMMER.)

1. La tuberculina (la tuberculina vieja y la tuberculina nueva), merecen ser concideradas con atención en el tratamiento de la tuberculosis del pulmón y de otros órganos.

2. La tuberculina usada como se debe es un remedio sin peligro.

3. El médico que prescribe la tuberculina debe estar bien familiarizado con el tecnismo del empleo y debe tener una experiencia suficiente á fin de poder juzgar con exactitud los sintomas de la reacción.

4. La tuberculina puede emplearse en todo caso, aun en el periíodo avanzado de la tuberculosis. En tales casos aunque la cura no es esperada, la tuberculina puede eliminar muchos síntomas desagradables de la enfermedad. La cura puede esperarse en los casos que están en el primer estado (clasificación de Turban), lo mismo puede esperarse de los casos en el segundo estado y aun en el tercero.

5. El tratamiento ideal del presente es la combinación del tratamiento climatológico con el tratamiento de la tuberculina.

La valeur et la praticabilité de l'emploi de la tuberculine dans la tuberculose pulmonaire.—(HAMMER.)

1. La tuberculine (tuberculine ancienne et tuberculine nouvelle) mérite d'être considérée au long dans le traitement de la tuberculose des poumons aussi bien que celle des autres organes.

2. La tuberculine correctement employée est un remède innocent.

3. Il faut que le médecin qui l'ordonne connaisse au fond la technique de son emploi et qu'il ait assez d'expérience pour pouvoir juger des signes de réaction.

4. On peut se servir de la tuberculine dans tous les cas de tuberculose, même les plus avancés. Dans ceux-ci on ne peut pas éspérer une guérison, mais on peut éviter beaucoup de symptômes désagréables. On peut s'attendre à la guérison dans les cas du premier étage (classification de Turban), aussi dans les cas du deuxième étage, et même quelquefois dans ceux du trosième.

5. La méthode idéale de traitement à présent se trouve dans une combinaison de traitement climatérique avec la tuberculine.

THE FILTERED BOUILLON OF THE HUMAN TUBERCLE BACILLUS AS AN AGENT FOR SPECIFIC TREATMENT OF TUBERCULOSIS IN MAN.

By J. Denys,

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About twelve years ago we recommended a specific treatment of tuberculosis, which presents two essential peculiarities:

1. The nature of the product employed.
2. The mode of using the product.

We explained our method in full in a volume that appeared in 1905, under the title "Le bouillon filtré du bacille de la tuberculose dans le traitement de la tuberculose humaine" (A. Uystpruyst, Louvain, et O. Doin, Paris), to which the reader is referred for more detailed information than can be given here.

Nature of the Product.

By filtering a well-developed culture of the bacillus of human tuberculosis in the ordinary peptone-glycerin bouillon through a porcelain filter, a transparent yellow liquid is obtained. This liquid has passed through no manipulation capable of effecting a change in its composition. It is not heated nor precipitated, nor is it treated by any chemical agents having a modifying action. A small quantity of thymol or of phenol may be added to insure its preservation.

Our tuberculin, which we describe briefly as B. F. (Bouillon Filtré), varies markedly in its composition from the other tuberculins—the old tuberculin of Koch, T. R., the bacillary emulsion of Koch, tuberculocidin and antiphthisin of Klebs, tuberculoplasmin of Buchner, tuberculol of Landman, oxytuberculin of Hirschfelder, etc. Béraneck's tuberculin resembles ours. It is composed of two products: first, a filtrate of the bouillon culture; second, an extract of the bacterial cell. In utilizing a filtrate Béraneck has simply imitated a process that we, and, following us, many other physicians, have used for nine years. With regard to the extracts from the bacterial cells, after many experiments, we believe them to be useless, and at best inferior to the filtrate, for the purpose of immunization.

C. Spengler, after having used the filtered bouillon of human tuberculosis, has recently abandoned it for the filtered bouillon of bovine tuberculosis.*

He believes that the two types of bacilli secrete different toxins, and that the toxin of the bovine bacillus has a superior immunizing power against human tuberculosis. We are not in accord with this opinion, for the following reasons: With regard to immunization, it is a principle of general application, whose exceptions can, for the time being, be ignored, that one toxin, differing from another toxin, cannot produce tolerance for the other toxin. If the toxin of bovine tuberculosis is different in nature from the toxin of human tuberculosis, injections of the latter cannot immunize the organism against the former. But they do so perfectly. Long before Spengler published his results it was known that men treated with one of these toxins tolerated the other toxin equally well. We have made repeated comparative experiments. We have given the B. F. of bovine tuberculosis to a series of patients who tolerated very well the B. F. of human tuberculosis, and found that the bovine B. F. was tolerated in such a manner as to exclude the duality of the toxins. Patients accustomed to strong doses of human B. F. tolerate strong doses of bovine B. F., and vice versâ. We cannot, therefore, consent to the views of C. Spengler concerning the special nature of the bovine toxin. Sometimes one of the two toxins gives speedier reactions than the other, but this difference depends, in our opinion, not on its nature, but on its concentration, which may vary according to the age of the culture and the particular conditions under which it is produced.

On still another point do we differ from Spengler. While he believes that reactions are necessary to produce the cure, we believe that reactions are useless, and, as a general rule, even injurious. He advises that we look for reactions, whereas, on the other hand, by our method we seek to avoid reactions.

It is remarkable that Koch, who has devoted so much of his time to the tuberculins, has not interested himself particularly in the filtered broth. His first tuberculin possessed some of the principles of the filtered broth, but he abandoned it later for the tuberculins extracted from bodies of bacilli, and he considered the latter, *i. e.*, the bacillary emulsion, as the most active product actually realizable. It is worthy of note that patients accustomed to large doses of our filtered broth are able to support at once and without preparation large doses of T. R. and of the bacillary emulsion of Koch, both tuberculins prepared solely with the bodies of bacilli. The substances contained in our filtrate therefore vaccinate against the poisons, which form an integral part of the bodies of bacilli.

* C. Spengler: "Ein neues immunisierendes Heilverfahren der Lungeschwindsucht mit Perlsuchttuberkulin," Deut. med. Wochenschr., 1904.

Biological Properties of B. F.

The subcutaneous injection of a sufficient dose of B. F. (the filtered bouillon of human tuberculosis) produces in a tuberculous man certain phenomena analogous in their immediate manifestations and appearances to those produced by the old tuberculin of Koch. These phenomena can be divided into three groups:

1. *The Cutaneous Phenomena.*—The phenomena of inflammation appear in the region of the puncture, and consist of redness, swelling, and pain. In the course of a few days these phenomena disappear, without evidence of suppuration. They make up what is termed the cutaneous reaction.

2. *The General Phenomena.*—These are: (1) Temperature: The temperature rises from a few tenths of a degree to two or three degrees or even more. (2) The nervous system: One notes depression, fatigue, headache, pains in the limbs, nervousness, insomnia. (3) Digestive apparatus: Diminution or loss of appetite, and, at times, nausea and vomiting. (4) Urinary organs: During the period of higher temperature the urine has a deeper color and urates are precipitated. (5) The blood: The leukocytes are increased. These several phenomena constitute the general reaction.

3. *Focal or Specific Phenomena.*—These phenomena are due to the action of B. F. on those organs which are tuberculous. They are specific—that is to say, they cannot be provoked except by the secretions of the tubercle bacillus. The other bacterial toxins can produce in the tuberculous patient a local inflammation, fever, malaise, etc., but they cannot have any specific action on the tuberculous focus. This specific action consists in the production of a congestion, more or less marked at the site of the infection, a congestion which can be demonstrated whenever the disease is superficial or accessible to the vision. There is a distinct recrudescence of morbid symptoms of the focus; thus in tuberculosis of the lungs there is an increase in the expectoration and the râles; in tuberculosis of the bladder there is increased micturition; in tuberculosis of the bones and joints there is an increase of joint pains, etc. When the focus has been quiescent and has not manifested itself by the symptom, the injection of tuberculin often brings it into evidence and betrays its localization by the appearance of new symptoms. This congestion of a tuberculous focus latent in the lung will bring out all the symptoms—oppression, interthoracic pains, râles, expectoration, etc.

To summarize: The B. F. in sufficient dose produces, in the tuberculous subject, three kinds of reaction: (1) The cutaneous reaction; (2) the general reaction; and (3) the focal or specific reaction. In order to produce all these reactions at once it is generally necessary to use rather large doses. The reactions may usually be obtained in quite marked degree with doses

of 0.001 gm. to 0.01 gm.; but in those tuberculous patients who are very sensitive, much smaller doses produce this effect. If the dose is not sufficiently large to produce the whole reaction picture, the phenomena diminish in degree and some fail to appear. If still feebler doses are used, the reaction phenomena may be further reduced, and may even be limited to a single phenomenon—a small swelling at the point of puncture or a rise of temperature of two-tenths or three-tenths of a degree. Finally, if the dose is diminished still further, all the reaction phenomena fail to appear or cannot be demonstrated on the closest examination. These reaction phenomena begin to appear on the day of the injection or on the following day, and their duration varies from a few hours to several days.

Mode of Employment of B. F.

We have seen that B. F. in proper dosage produces, in the tuberculous, a complex disturbance: inflammation at the site of puncture, elevation of temperature, malaise, depression, recrudescence of the symptoms of the disease, etc. With this in mind, it must be said that the B. F. should be employed in such a way as to avoid any distinct reaction phenomena. Our procedure admits of none but the minutest reactions, and these only exceptionally. This principle governs our whole system, and is the keystone of its structure. Everything in the treatment must conform to this principle, and must enable the patient to tolerate very large doses of B. F. without producing any marked disturbance. For these purposes, one condition is imperative: to commence with doses so small that every reaction will be obviated, or at least that the reaction phenomena will be extremely feeble. The proper beginning dose cannot be secured by using the B. F. as it comes from the filter. It is necessary to make dilutions, and even very feeble dilutions. We use nine dilutions:

The first dilution is.....1 : 100,000,000
The second dilution is.....1 : 10,000,000
The third dilution is.....1 : 1,000,000
The fourth dilution is.....1 : 100,000
The fifth dilution is.....1 : 10,000
The sixth dilution is.....1 : 1000
The seventh dilution is.....1 : 100
The eighth dilution is.....1 : 10
The ninth dilution is B. F. as it has passed the filter.

The B. F. content of each of these solutions is as follows:

0.1 c.c. of the 1 : 100,000,000 dilution contains.....0.000000001 of B. F.
0.1 c.c. of the 1 : 10,000,000 dilution contains.....0.00000001 of B. F.
0.1 c.c. of the 1 : 1,000,000 dilution contains.....0.0000001 of B. F.
0.1 c.c. of the 1 : 100,000 dilution contains.....0.000001 of B. F.
0.1 c.c. of the 1 : 10,000 dilution contains.....0.00001 of B. F.
0.1 c.c. of the 1 : 1000 dilution contains.....0.0001 of B. F.
0.1 c.c. of the 1 : 100 dilution contains.....0.001 of B. F.
0.1 c.c. of the 1 : 10 dilution contains.....0.01 of B. F.

With the fourth dilution (1 : 100,000) reactions can be obtained that, we believe, are too strong in very sensitive patients. The following chart shows a series of reactions produced by this solution in a patient with tuberculosis at the apex of the right lung. Of this fourth solution, 0.1 c.c., equivalent to 0.000001 gm., of B. F., raised the temperature to 38° C. Later injections in the same dosage produced slighter elevations, but they were marked, nevertheless. Even stronger reactions can be obtained in some febrile patients with doses 100 times weaker. Considering the activity of the B. F., and the necessity of avoiding, if possible, even the minutest reaction, it is indispensable that the initial dose be very minute.

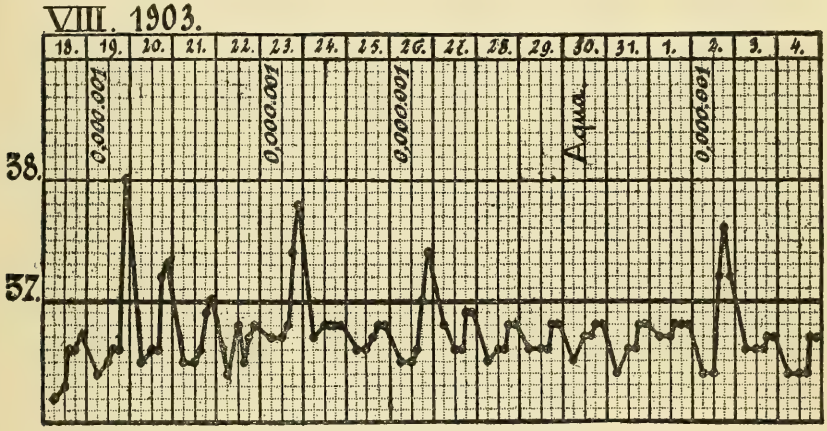

Fig. 1.

In patients whose temperature does not exceed 37° C. it is our custom to begin with the third solution (1 : 1,000,000). The first dose should be 0.05 or 0.1 c.c. For febrile patients, whose temperature exceeds 37° C., and who are very sensitive in general, we use solution No. 1—the dilution 1 : 100,000,000. The first dose should be 0.05 or 0.1 c.c. By commencing the treatment with such small doses, danger is avoided. With timid patients even smaller doses might be used, although we believe that in this way time is wasted. In our opinion it is useless to push the dilutions further than 1 : 10,000,000. These are the proper doses for adults; for infants the doses should be reduced one-half to one-fourth.

Before proceeding further it is most important to determine carefully whether or not the patient has reacted to the first injection. As has previously been stated, the effects of the injection are classified as local, general, and specific. It is necessary to dwell somewhat at length on each of these three classes.

1. Local Effects.—Has the patient complained, some hours after the

puncture, of pain at the point of injection? How long did this pain continue, and was it severe or inconsiderable? Could the patient lie upon the affected region? Did he endeavor to protect it from touch and from pressure? Has he noticed that this spot has become red, warm, hardened, or painful? After having answered these questions, a personal examination of the region should be made. If the reaction was pronounced, inspection would disclose the swelling and redness. But with initial doses such as we have recommended the manifestations are not usually appreciable on inspection, and perhaps not even to touch. In this case a fold of the skin should be lifted up about the puncture, when it will be very easy to determine if there is any disturbance of the cellular tissue. At the same time it can be ascertained whether the skin has become adherent to the underlying layers. If doubt exists, a similar fold of skin should be examined in the corresponding region on the other side of the body, making a comparison as to thickness and mobility of the two folds, thus learning easily and surely whether or not a reaction has occurred. A grimace of the patient, or a single instinctive shrinking, would indicate that the puncture is still tender.

The lymphatic ganglia of the region should be examined with equal care. Sometimes they become enlarged and painful, but this condition rarely arises if one begins with the doses recommended.

2. General Effects.—Has the patient had headache or pain in his limbs, malaise, depression, fatigue, nervousness, insomnia, somnolence, or impaired appetite? When did any of these manifestations appear—on the same day or on the day following—and how many days did they continue? To what degree were these symptoms present? Did the patient attend to business or did he remain in bed? A point deserving special attention is the temperature. Did it maintain its former level, or was it elevated, and how much and how long?

3. Specific Effects.—The inquiries vary according to the seat of the affection. Only the more important will be given here.

Tuberculosis of the Respiratory Tract.—Has the patient had oppression? Did cough and expectoration grow worse? Has he felt a stitch in his side?

Abdominal Tuberculosis.—Has he had a return of pain, or colic, or of diarrhea?

Tuberculosis of the Urinary Tract.—Has micturition been more frequent? Did blood appear?

Tuberculosis of Bones and Joints.—Did the affected parts become painful, or were the usual pains aggravated?

When the affected organs can be thoroughly explored, the objective changes should be carefully examined—for example, the congestion of those parts that can be inspected, the appearance of râles or their increase, an increased volume of the organs accessible to palpation.

It may be remarked here that this lengthy enumeration of points demanding the attention of the physician does not mean that all these manifestations—inflammation of the conjunctival or subcutaneous tissue, malaise, fever, aggravated symptoms of the disease, etc.—are likely to be present at the same time. If one has begun with the small quantities that I have advised, he cannot often find any trace of reaction, and it is only after a very careful examination and considerable inquiry that any reaction phenomena can be discovered. Supposing that the inquiry after the first injection is completely negative, and that no local, general, or specific manifestations have occurred: under such circumstances it is useless to repeat the dose, and the second dose should be larger. But how shall we proceed with this augmentation?

The dose should be increased according to the tolerance of the patient. Experience has shown that our nine solutions answer well enough in the average state of tolerance. The increase at first is by small quantities—by fractions of milligrams; then by milligrams (with solution 7); later by centigrams (solution 8) and by decigrams (solution 9). Patients who quickly acquire tolerance for B. F. can come up to solution 9 in a few months, but with others reactions occur, and one must proceed more slowly. A few patients cannot take the pure solution for the first two years or longer. When one encounters a reaction, however feeble, even though it consist of but a single symptom, the following rules should be observed:

1. Never make a fresh injection during a reaction.

2. Do not proceed as soon as the reaction is over, but wait one, two, or more days after the reaction has completely passed. The interval after the reaction should be longer in proportion as the reaction was more or less severe.

3. In cases where the reaction has been strong stop at the same dose, or even diminish the dose.

All these rules are founded on the first principle of this treatment: to habituate the patient to strong doses of B. F. without disturbing his health. Let us see, for example, how these rules ought to be applied in the treatment of a man of thirty, having tuberculosis of both lungs and of the larynx, who is badly nourished and somewhat febrile. The following three charts cover the treatment from April 28, 1904, to June 20, 1904.

The first injection was made on April 29th, with 0.0000001 gm., *i. e.*, $\frac{1}{10000}$ milligram of filtered broth. In the evening the temperature (37.5° C.) exceeded that of the day before (37.3° C.). This rise is attributable to the injection, and was considered a reaction. Therefore the following rules had to be applied: (1) Not to inject during the reaction. (2) To leave between the end of the reaction and the following injection a respite of at least

one day. (3) Not to increase the dose. In order to conform to these rules, we put off the second injection until May 2d, when we again injected 0.0000001 gm. Every reaction being missed by the second injection, as well

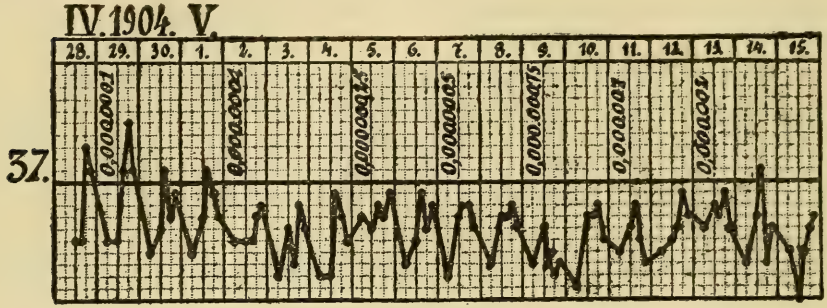

Fig. 2.

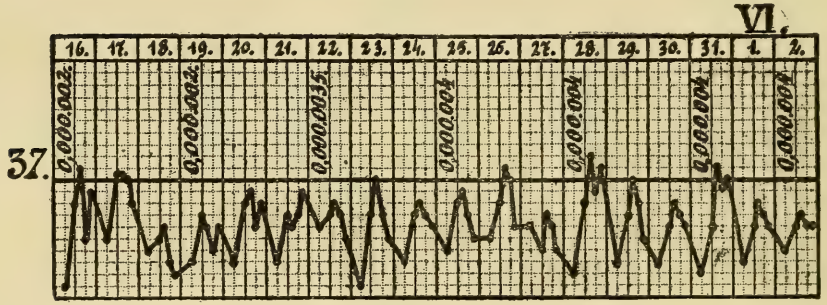

Fig. 2 *a*.

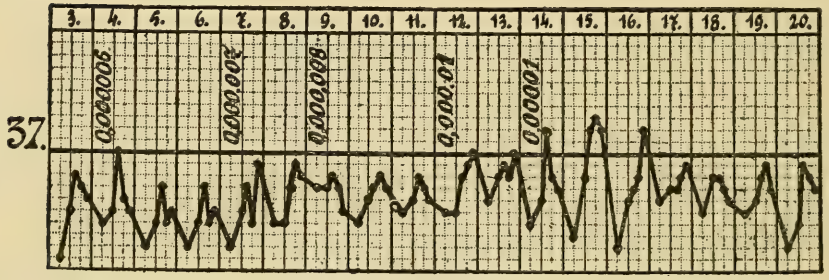

Fig. 2 *b*.

as by the following four injections, we administered successively 0.00000025, 0.0000005, 0.00000075, 0.0000001 gm. On May 13th we reached 0.000002, and on the following day the temperature was 37.1° C. During twelve days the curve did not rise higher than 36.9° C.; we considered this 37.1° C. a

reaction, and we repeated this dose three days later. We again obtained a reaction (37.1° C. on May 16th and 17th). Only by the third injection the dose of 0.000002 gm. produced no further effect. The toleration acquired justified a new progression: 0.0000035 gm., but at 0.000004 gm. we again had a thermic elevation (37.1° C. the following day). At the same time a recrudescence of the cough manifested itself. This indicates that the former dose must be repeated, which was done May 28th and 31st and June 2d. At the fourth injection the patient no longer responded by an elevation of temperature. The toleration allowed us to pass to 0.000006 gm., which

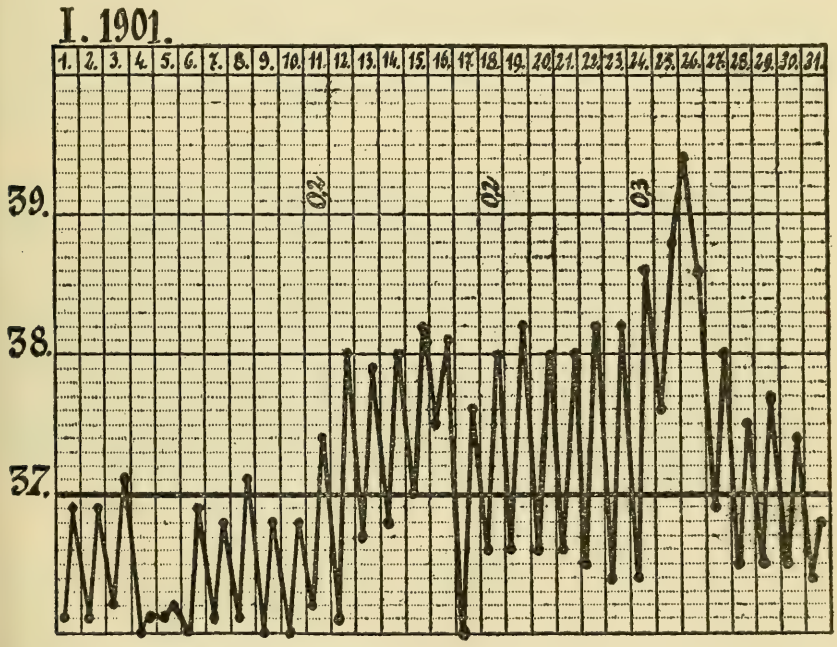

Fig. 3.—Showing danger of repeating dose before former reaction subsides. Also shows initial dose 200,000 times too large.

seemed to give a slight reaction—37° the same day. We ignored this slight manifestation, and gave successively 0.000007, 0.000008, 0.00001 gm. This last dose was now 100 times stronger than the first one. It gave rise, on June 12th and 13th, to an increase of temperature. This rising should interdict the injection on the 14th. After a reaction, a respite of at least twenty-four hours must be allowed, but this rule was transgressed and a second dose of 0.00001 gm. was injected on the 14th. The consequences of this transgression are evident: it gave rise to a much stronger and more prolonged reaction (a maximum of 37.3° C. on the 15th), and lasting three days.

This illustrates how even very slight thermic reactions must be taken into account in treatment by means of B. F. Other reactions also, whatever their nature or their intensity, must be taken into account. If the injection produces a slight painful swelling at the point of puncture, or if mild prostration or slight headache ensue, the same dose must be repeated until these effects no longer follow. The success of the treatment is immediately dependent on this mode of procedure. The fact that many physicians have ignored these rules explains the unsatisfactory results obtained by them with B. F.

Important Errors in the Treatment by Means of B. F.

1. *Beginning with Strong Doses.*—As an example may be cited the following case (Fig. 3): A young man having caries of the thigh bone and of the left elbow and suppurating ganglia in the left groin was treated with B. F. The temperature did not rise above 37.1° C. The first dose should

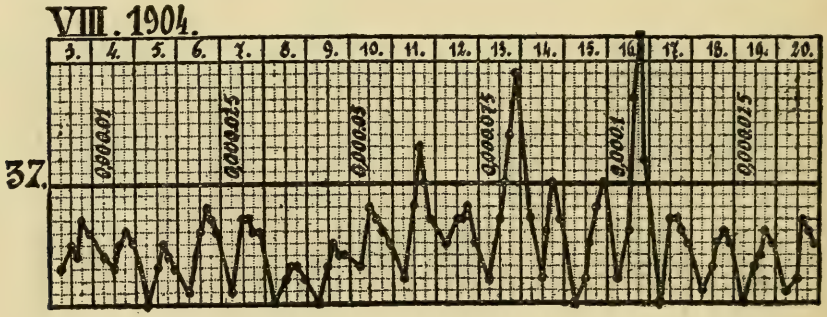

Fig. 4.—Showing danger of increasing dose after a reaction has occurred.

have been 0.000001 gm. Instead, however, 0.2 gm., that is to say, 200,000 times too much, was given. The temperature immediately began to rise, and toward evening was above 38° C. No one will say that morphin should be classed as a dangerous poison and eliminated from therapeutics simply because one ignorant doctor began a treatment with an injection 100,000 or 200,000 times the standard dose. Similarly, an initial dose of tuberculin 200,000 times too strong is an error quite as reprehensible.

2. *To Make a New Injection During a Reaction or Immediately After a Reaction.*—It has been previously stated that if a reaction, however feeble, occurs, a rest of one day or of several days must intervene before another injection is made. In the case of a man who received at the first injection a dose 200,000 times too strong, this rule was transgressed. On January 18th he still had fever, and on the 24th he was given a second dose, half as strong again as the first one,—300,000 times too strong,—which sent the temperature up to 39.5° C. (Fig. 3).

3. *To Increase the Dose When There has been a Reaction.*—The following case (Fig. 4) shows the reasons why this mistake must be avoided. In this case, as the chart will show, a clear reaction appeared on the 11th, after the third injection, 0.00005 gm., was given. The temperature rose to 37.3° C. The next dose should not have been larger. Nevertheless, on the 13th, an injection of 0.000075 gm. was given, which was followed by a temperature of 37.9° C. Without profiting by this experience, the next dose, given on the 16th, was 0.0001 gm., which raised the temperature to 38.2° C. Thus we see stronger and stronger reactions resulting from a transgression of the rule that forbids increasing the dose in the event of even the slightest reaction.

4. *Ignoring Other Reactions Than Those of Fever.*—Not only the thermic reactions, but the local reactions at the point of injection (painful swelling), the general reactions, such as lassitude, headache, depression, loss of appe-

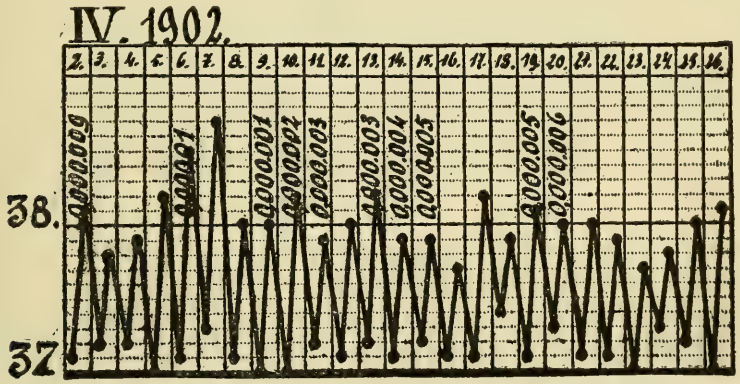

Fig. 5.—Reaction, strictly local, April 2d. General reaction follows increased dose on April 6th.

tite, and the specific reactions, increased cough and expectoration, must all be considered. Some patients react very little or not at all so far as temperature is concerned, although they may react manifestly in other ways. For instance, chart 5 is that of a patient whose cure was compromised because the non-thermic reactions were ignored. He had pulmonary tuberculosis complicated by empyema, with temperature ranging from 38.3° to 38.8° C. in the evening. This was the situation when treatment was begun on March 25th with 0.000001 gm. of B. F. On April 2d the dose had been raised to 0.000009, without any manifestations worth mentioning (Fig. 5). The next dose, 0.00001 gm., gave rise to a slight thermic reaction. As a measure of prudence we advised a repetition of the initial dose, 0.000001 gm., and to regain the zone of reaction rapidly by injecting every day and increasing the dose each day by 0.000001 gm. This was done on April 9th, 10th, 11th,

13th, 14th, and 15th. The temperature was not influenced, unless the injections caused the maximum of 37.2° on April 10th and 13th. If only the thermic condition was considered, one would decide that the tuberculin was

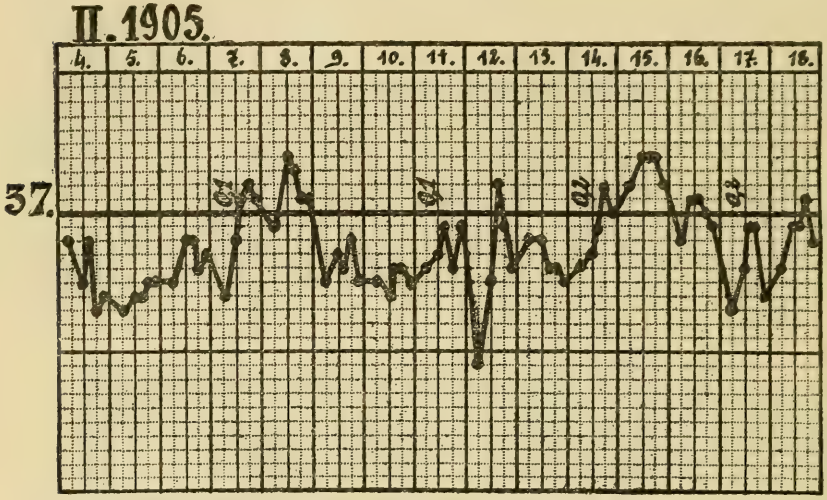

Fig. 6.

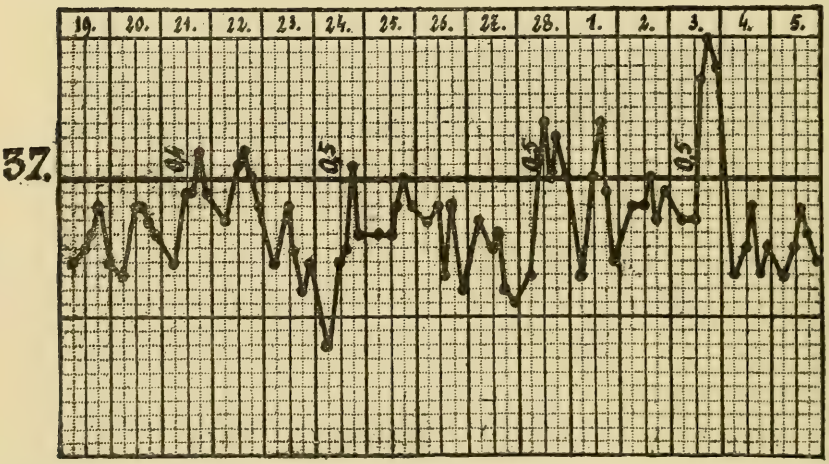

Fig. 6*a*.—Showing bad result of too large dosage. Reaction follows every injection.

well tolerated. In reality it was not well borne, as was shown by a letter written by the patient on the 14th. He says: "For several days I have had almost no appetite. I have no taste for food. . . When I get up I feel a certain weakness in the arms and legs. The injections have produced a

swelling where they were made. It is swollen in a radius of from three to six centimeters around the puncture. This swelling, which did not appear at the time of the earlier injections, lasted for two or three days." From this we see that this patient was in a state of reaction for several days, while the physician, being unaware that a reaction was occurring, continued to increase the dose. In a letter dated April 21st the patient writes: "My physician has handed me your printed instructions for the use of the filtered broth. I now see that the headache, prostration, loss of appetite, the depression, and weakness belong to the reaction. I feel all these symptoms, as I told you in my last letter; therefore we have not made any injection to-day. The normal situation seemed to come back on the 18th and 19th, but the injections of the 19th and 20th have caused me to relapse into greater prostration than before." The last few lines of this patient's letter show very clearly the relation between injections and the symptoms, subjective and objective. On the 18th and 19th this patient began to improve, when two new injections caused a return of the prostration to a greater degree than before, and this without a rise of temperature. We advised that the injections be suspended for some time. All the symptoms of reaction disappeared, the appetite returned, and the treatment was resumed on April 28th, beginning again with a dose of 0.000001 gm. From this time on the injections were given in correct dosage and gave no reaction. In July the patient tolerated 0.001 gm., and his temperature no longer went above 37.1° C. At this time we made six aspirations and withdrew 2900 c.c. of pus. The empyema did not recur, the bacilli disappeared from the sputum, and in October, 1902, this young man resumed his former employment, which has not been interrupted since. His health is good.

5. *Persisting in the Treatment when Numerous Reactions Occur.*—To carry on this treatment with the best hope of success one must avoid frequent reactions, no matter how trivial they may appear. Therefore we emphatically condemn the procedure in the following case. Only part of the chart is reproduced (Fig. 6). Beginning when the patient received a dose of 0.1 gm., which is a strong dose, it is seen that every one of the eight injections was followed by a rise of temperature. This reaction is likely to occur in the "chronic stage," and such cases give bad results. From this chart it is also evident that the doses were increased, notwithstanding the reactions.

Results Obtained by the Use of B. F. in the Different Forms of Human Tuberculosis.

To establish the efficacy of B. F. we shall direct our attention especially to ulcerated pulmonary tuberculosis, that is to say, those cases with bacilli in the phlegm. Since 1896 we have examined about 4000 patients in this condition. Of these, some frequented the dispensary established at the

Institute of Bacteriology, Louvain, for the treatment of tuberculosis by specific injections, whereas others were private patients. Only the latter will be considered here.

The statistics that have been brought up to date concerning the action of the tuberculins are based on patients especially chosen. Only those in favorable condition were subjected to the treatment. Those who were badly nourished, who had fever, or who presented advanced lesions were rejected. We shall consider here all the consumptives with bacilli in the sputum seen in private practice during a period of five years, and whose treatment lasted a sufficiently long time. These patients number 926. Of this number we will eliminate 54 who refused injections; 42 who did not persevere for a sufficiently long time; 120 from whom we could obtain no subsequent information, either directly or indirectly; 92 who failed to carry out the method as prescribed. Of the 618 remaining, 101 were too far advanced and received no injection; 75 were in a similar condition, but received a few injections of ineffective doses, given for their moral effect. After eliminating these 176 hopeless cases 442 patients remained.

Among these 442 patients 46 were no more hopeful than the 176 who were previously eliminated, though their lives were prolonged and they became able to tolerate very large doses, if not strong ones ($\frac{1}{10}$ milligram or even 1 milligram).

Fig. 7 shows the results obtained by the injection of B. F. on these 442 subjects; it also indicates the relations that exist between the extent of the lesions and the chances of cure or amelioration. This figure includes 42 squares, occupied by a certain number of black dots, each one corresponding to a patient. The distribution of these dots in the several inclosures indicates the extent of the lesions and the results obtained. The extent of the lesion is indicated on the small drawings of the thorax, which are found at the left-hand side of the sketch. These are associated in pairs, the one on the left representing a front view of the thorax, those on the right a back view of the thorax. The extent of the damage is indicated by a black spot. Only the unmistakable alterations are recorded: obvious diminution of sonorousness, râles, cracklings, rumblings, gasps. If we had taken into account the smaller, but somewhat doubtful, modifications in the respiratory sounds, the area of damage in nearly all these cases would have been enlarged. We prefer to show only the unmistakable alterations.

We distinguished six types: Type I does not show clear lesions, but bacilli are present in the sputum.

In Type II the lesions are confined to the supraclavicular space and the suprascapular space.

In Type III the lesions do not extend beyond the second rib in front and the superior edge of the upper scapular border behind.

In Type IV they do not extend beyond the third rib in front and the middle of the scapula behind.

In Type V they occupy one entire lung.

In Type VI, for which we have not inserted a diagram of the thorax,

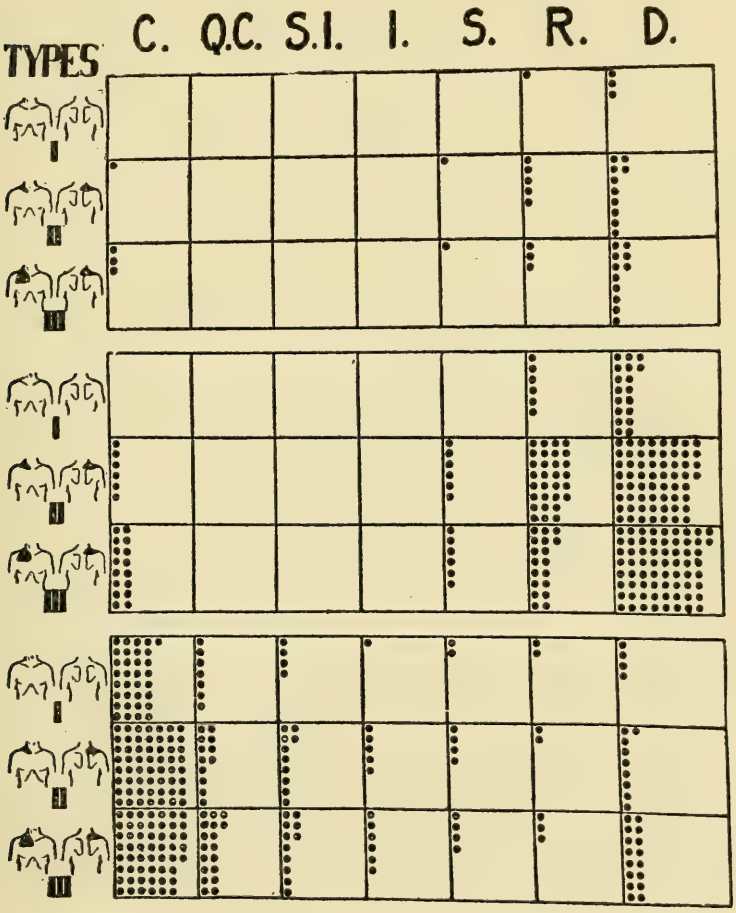

Fig. 7.

there are serious lesions in both lungs, though generally predominant on one side.

The contents of the rectangles are to be read from the top downward, and are indicated by the letters across the top of the sketch: C. signifies cured patients (disappearance of the bacillus); Q. C., patients quasi-cured, that is, having the appearance of health, but still expectorating slightly and showing bacilli. This expectoration does not indicate active

infectious processes, but the results of evacuation of microbes from the caseous areas. S. I. signifies improvement. One of the conditions is that they are free from fever. I. stands for improved. S. indicates a stationary condition. R. stands for retrograde patients. D. means dead.

One of the first things to attract the attention in the inspection of the sketch is the considerable proportion of recoveries—193 (43.6 per cent.) occupy column C. This is a remarkable result, in an affection in which death is the natural and normal evolution.

Cures	193 or 43.6	per cent.	Total of success, 71 per cent.
Quasi-cures	56 or 12.6	"	
Strong ameliorations	36 or 8.1	"	
Ameliorations	29 or 6.5	"	
Stationary states	19 or 4.2	"	Total of non-success, 29 per cent.
Retrograde	9 or 2.0	"	
Dead	100 or 22.6	"	

Thus in 71 per cent. of cases the treatment has given positive results. It has miscarried in 29 per cent. We must not forget that, of the dead, 46 were already in a desperate condition when treatment was begun, and who have been included in the statistics because the injections were extended over a prolonged period. Although in the majority of these cases the dose did not exceed 0.00001 gm. of pure B. F., the injections seem to have delayed the fatal termination. If we eliminate these 46 cases, we obtain 79 per cent. of success and 21 per cent. of non-success.

Affinity Between the Chances of Success and the Extent of the Lesions.—A second very important lesson to be learned from the chart is that the chances of cure and amelioration are much stronger as the lesions are less advanced. This fact is demonstrated very clearly by the distribution of the dots. Those that correspond to patients with less extensive lesions (Types I, II, III) are especially accumulated in the C. column, whereas those representing Types V and VI prevail in column D. The contrast would be still stronger if we had introduced into the sketch the 176 patients who received no injections or received them only for their psychic effect. The great majority of these cases belong to Types V and VI, and would have been included in the lower right-hand corner of the diagram. The following figures show the relations between the results and the extent of the lesions.

Type	I	gives	33	recoveries,	*i. e.*,	62.2	per	cent.
"	II	"	56	"	"	57.1	"	"
"	III	"	53	"	"	47.7	"	"
"	IV	"	14	"	"	34.1	"	"
"	V	"	19	"	"	23.7	"	"
"	VI	"	18	"	"	30.5	"	"

The treatment must be instituted as soon as possible after its onset. By retracing the history of patients arrived late and in a hopeless condition, we will nearly always find that these passed through a somewhat prolonged

period, during which the injections would have been of great utility. When physicians have learned to use specific treatment at the first signs of illness, and when the people are better informed as to the insidious onset of tuberculosis, treatment will be commenced without delay, and the number of cures will be greatly increased. It is not too much to say that pulmonary tuberculosis, a disease nearly always fatal without proper treatment, will then be classed among the easily curable affections. This statement is strongly supported by the fact that our "closed" cases—those that had not yet reached an ulcerative stage, with the elimination of bacilli—all recovered by our method of treatment. The history of many of our patients dates back to the years 1899, 1900, and 1901, that is to say, from a time when the principles of our treatment were not so well defined as they are to-day, when the initial doses were much stronger—in fact, too strong.

The Impossibility of Explaining These Results Otherwise Than by the Treatment with B. F.

One must bear in mind that "open" pulmonary tuberculosis, that is to say, those cases showing bacilli in the sputum, is an illness that, left to itself, is nearly always fatal. At best, certain agents, like arsenic and creosote, may delay its progress. As a means of cure there is nothing beyond the hygienic-dietetic method, of which the main elements are rest, fresh air, and superalimentation. Each of these agents, taken alone, has very limited value, and all must be combined if real benefit is to be derived. Moreover, these agents cannot very well be applied except under special conditions—namely, in the sanatorium.

It is impossible to ascribe our results to the hygienic-dietetic cure, since only 5 out of 442 patients have combined the injections with a sojourn in a sanatorium. A few have practised the hygienic-dietetic treatment more or less carefully at home, and usually in populous centers; others have used one or another element of the hygienic-dietetic cure,—either rest or superalimentation,—but such half-way measures yield no considerable advantage. The majority of our patients have followed no special régime and have followed their occupations. In the treatment of our cases everything has been subordinate and secondary to the B. F., and the success can be attributed only to the injections.

Fate of the Patients who Refused B. F.

We have seen that, among those who came to consult us for the sake of treatment with B. F., 54 either objected to the injections or did not consent until aggravation of their symptoms occurred. Their refusal generally arose from the influence of their physicians, who argued that the treatment was inefficacious and even dangerous. In this way a good many patients

played the rôle of the "control animals" of experimental medicine. When we wish to study the influence of an agent upon an animal, we subject a second animal to the same conditions, except that it is not submitted to the agent whose effects one wishes to observe.

The 54 patients who refused the treatment by B. F. were the equivalents of the same number of "control animals." Among these 54 patients there were some whose lesions were so far advanced, or so rapidly progressive, that success could not be counted upon. On the other hand, 39 of them were patients whose condition warranted the belief that the treatment with B. F. would be undertaken under the most favorable auspices. Some of them belonged to Types I, II, and III. If they had fever, they remained

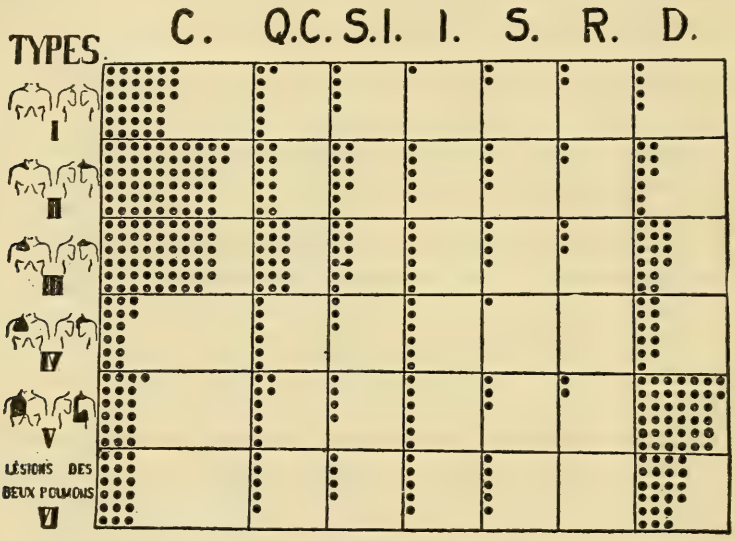

Fig. 8.

in bed until it disappeared. We assert without hesitation that a majority of them, if they had been treated with B. F., would have experienced an arrest of the disease, with considerable general improvement, and that a large proportion would have recovered. An examination of Fig. 7 will indicate about what the chances are with patients of Types I, II, and III. Now, what has become of these 39 patients—"controls"—who, presenting themselves under the most favorable conditions, did not accept the injections (34 out of 39), or who consented to the treatment only after marked aggravation of their symptoms (5 out of 39)? The answer to this question is most instructive. Indeed, if this group showed a proportion of cures and ameliorations as considerable as the group of those injected, the conclusion

would follow that B. F. is an agent without any efficacy. On the other hand, if the group of "controls" shows an extraordinary predominance of deaths and of aggravations, this would be evidence that there is curative property in the B. F.

Fig. 8 shows the condition of these patients in August, 1905. The diagram concerns the 34 patients who refused the cure and the 5 others who, after delay, requested to be treated with B. F. The diagram is made up of three separate rectangles. Each dot corresponds to a patient. The diagrams of the thorax on the left, and the letters at the top of the diagram, have the same significance as in Fig. 7—that is to say, they indicate the manifest lesions. At this point the uppermost of the three rectangles is of interest. It includes the 39 dots corresponding to the 39 "control" patients. We can see at a glance that in nearly all these patients the affection made considerable progress, and that the majority of them are dead. Since the drawing was made (August, 1905) two more deaths have occurred in this group. The following figures indicate the condition of these patients in August, 1905:

Recovered	4
Quasi-recovered	0
Strong ameliorations	0
Ameliorations	0
Stationary state	2
Retrograde	9
Dead	24
Total	39

If we compare this upper rectangle of Fig. 8 with the upper rectangle in Fig. 7, remembering that Fig. 7 includes the injected patients of the same types, then the difference between the injected patients and the non-injected or "controls" asserts itself. It becomes more striking if we equalize the numbers. This part of Fig. 7 includes 262 patients. Dividing this by 39, the number in the same part of Fig. 8, we obtain the quotient 6.7. It will, however, be easier for us simply to use 6 as a factor.

Let us make a new rectangle. In this each control will be represented by six dots, and so we shall have a graphic exhibit, easily comparable to the upper rectangle in Fig. 7. This has been done in the middle rectangle of Fig. 8. Now we compare this middle rectangle with the lowermost rectangle in Fig. 8, which is merely a reproduction of the upper rectangle from Fig. 7, and Fig. 7, be it remembered, concerns the patients who were injected. When the numbers are thus fairly equalized, a comparison of the right and minor rectangles in the two diagrams gives one a striking picture of the difference in evolution in the two classes of patients. In the middle rectangle the dots group themselves very strongly in the right extremity in the death column. In the other rectangle the dots accumulated, for the most part, at

the left, in the columns of the cured and the quasi-cured. It would seem that the significance of these figures is somewhat peremptory, and that the history of these patients who refused injections gives to our clinical observations the value of experiments in the laboratory with "control" animals. It would be difficult for any one to contend that if we had had 234 refractory patients instead of 39, the distribution of the dots would have been different. We believe that the figures would tell very nearly the same story if we had, in fact, employed 234 "control" patients. Some one may assert that this "control" group, taken in its entirety, was in inferior condition. This would be a profound error. In fact, so far as the gravity of the lesions is concerned, the group of those injected had some disadvantage. Out of the 262 patients who were injected, there were 21 who were never free from fever; 11 were in a desperate situation when the treatment was begun. As to the hygienic conditions, all the advantages belong to the "control" group. Eleven of them, that is, 28 per cent., had taken one or more courses of treatment in a sanatorium; whereas among the injected patients, only five (that is, 1 per cent.) had recourse to sanatorium treatment. Moreover, it may be said that these "control" patients were somewhat piqued by the want of respect shown the hygienic-dietetic treatment as a complete therapeutic measure, and had resolved to practise the hygienic-dietetic regimen more rigorously than our injected patients. I believe that if there is a difference between the two groups of patients, it is in favor of the "controls." Four of these "control" patients, realizing that they grew worse in spite of the hygienic-dietetic treatment, had recourse to B. F. Of these four patients, one has recovered and the other three have improved. If they had persisted in their refusal of specific treatment, the general mortality of the "controls" would have been larger.

Conclusions Drawn from the Use of B. F. in "Open" Pulmonary Tuberculosis.

Numerous recoveries and ameliorations obtained by the use of B. F., when the fate of the injected patients is brought into comparison with the fate of those who were not injected, prove that the filtered broth of the tubercle bacillus has an unquestionable efficacy in cases of tuberculosis in the ulcerative stage and discharging bacilli ("open" cases). When the disease is not too far advanced, B. F. acts as a healing agent. In the future better results may be counted upon than are obtained now.

Our statistics furnish 43.6 per cent. of recoveries and 71 per cent. of successes. Do these figures express in a definite way the benefits that B. F. is able to produce in "open" pulmonary tuberculosis? Certainly not, and for the reason that, in the majority of cases, the injection ought to be commenced at an earlier stage of the disease.

One must not forget that among the patients whom we record 46 were in the very last stages and did not offer any hope of amelioration. Many others were in a very precarious condition, and resorted to the injections after they had been disappointed with other methods. On inquiry it could usually be learned that these patients had been for several months or for a year or even longer in very good condition—a condition altogether favorable for treatment by B. F. Unfortunately, they had allowed this propitious period to pass, and had presented themselves for treatment by B. F. when their favorable chances had considerably diminished. To be sure, one meets cases in which tuberculosis shows such virulence at the onset that all attempts at cure must fail. In the large majority of cases, however, tuberculosis does not take this virulent form, and the onset is gradual, the lesion advancing slowly, even laboriously; fever is not present, or, if present, can be made to disappear by simply remaining in bed. In short, the last stages of pulmonary tuberculosis—what we call phthisis or consumption—are generally preceded by a rather prolonged period, eminently favorable to antituberculous vaccination.

We believe that if all patients were treated as nearly as possible on the first appearance of bacilli in the sputum, the immense majority would be curable by the B. F., either alone or associated with the hygienic-dietetic regimen. It is to be deplored that this epoch of systematic treatment in the early stages has not yet arrived. Many physicians keep up an opposition to the specific treatment, and the patient remains ignorant of the insidious advance that tuberculosis makes in the majority of cases. We assert that when these two difficulties are removed, the mortality from tuberculosis will fall to a low figure. Then we shall be able to declare that consumption is the most curable of the chronic diseases.

Results in Closed Pulmonary Tuberculosis.

Our optimistic views derive much support from the manner in which the B. F. acts on pulmonary tuberculosis before the bacillus appears in the sputum ("closed" cases). When the germs establish themselves in the lungs, they do not immediately appear in the sputum, but appear only after the lesion has ulcerated. It is at this point that "closed" cases become "open" cases, and at that moment the danger of the patient increases considerably, since he is exposed to the possibility of the bacilli attacking the healthy portions of his respiratory apparatus and creating new foci of disease. Between the first implantation of the bacillus in the lung and its appearance in the sputum a rather prolonged period passes, in which the infection shows itself by a dry cough or a cough followed by expectoration without bacilli, panting, painful sensations in the chest, loss of appetite, anemia, loss of weight, lassitude, fever. Sometimes one can find evident

alterations in the respiration and in the pulmonary resonance. This period, which one would call the prebacillary period, because it precedes the appearance of the bacillus in the expectoration, is the period par excellence for treatment with B. F.

What are the results from the use of B. F. in the prebacillary stage? During the period from the beginning of April, 1899, until March, 1904, we have seen 71 patients in this stage. Thirteen of them had manifest pulmonary lesions; in others the cough, expectoration, intrathoracic pain, and hemoptysis sufficed to localize the tuberculous center in the respiratory apparatus. In all of these the diagnosis was tested by means of Koch's tuberculin. Of these 71 patients, 50 have undergone treatment with B. F. for from three to six months. All are alive, and have been relieved of the symptoms of their affection. The pulmonary lesions have undergone cicatrization; the residues persist. In the prebacillary period we have obtained 100 per cent. of recoveries without having recourse to the hygienic-dietetic régime of the sanatorium. Among the 21 patients who had refused the cure, 5 died of tuberculosis in August, 1905, the month when our numerical statements were made. Our prebacillary "controls," just as in the case of the bacillary "controls," paid a heavy death-toll.

The Prognosis of Pulmonary Tuberculosis Treated by B. F.

As has been said, the results can be looked upon as certain in "closed" tuberculosis. Unless fever is present, no special regimen is necessary. We allow the patients to follow their ordinary occupations, always advising them to avoid overexertion. The effects of the treatment are usually manifested rapidly. Improvement can be noticed in a few weeks, four to six months usually sufficing for a cure. In "open" pulmonary tuberculosis (bacilli in the sputum) it is necessary, from the viewpoint of prognosis, to recognize the following classifications:

1. The patient has no fever. It is all but certain that the treatment with B. F. will arrest the disease. If the lesions are but slight, health may be completely reëstablished.

2. The patient has fever, but rest in bed relieves the fever within three weeks. The outlook is almost as favorable as for the preceding class.

3. The fever persists beyond three weeks in spite of rest in bed. Here success is not quite so good. The fever is not a contraindication to the treatment, but, on the contrary, the B. F. will contribute to the relief of the fever.

In the last stage (extensive lesions, strong hectic fever, want of appetite, abundant night-sweats) the chances are very slim. The hygienic-dietetic cure hastens the amelioration and the cure of patients who are in favorable conditions, and improves the chances of success in the advanced cases. In "open" tuberculosis the duration of the cure varies from six months to two years and longer. The average can be put down as twelve months.

The short and the most favorable period is that of closed lesions. Next come the cases of open lesions, developing gradually, and that are treated at their beginning—that is to say, in the first months. We are quite certain that if all tuberculous patients could be injected in these two periods, the mortality of tuberculosis would be low. The very rapid forms (galloping consumption) are about the only ones that B. F. will not benefit. In all other forms of tuberculosis—pleurisy, enteritis, peritonitis, urinary tuberculosis, glandular, osseous, and articular tuberculosis—whether they are advanced or in rapid progress, the B. F. brings about its immunizing action in an incontestable manner.

It is safe to say that this method really constitutes a specific treatment. Beyond doubt, it will be found speedy and effective, but, I repeat, the specific treatment is a reality, and permits the saving of many lives.

For more detailed information I must refer to the work quoted at the beginning of this report. There one will find the reasons that led us to believe, since 1899, according to the studies of our pupil, Broden, that the immunity against tuberculosis resides especially in the fixed cells, that it is, above all, a cellular immunity, and not a humoral immunity.

Le bouillon filtré (B. F.) du bacille de la tuberculose humaine comme agent curatif des affections tuberculeuses de l'homme.—(DENYS.)

Préconisation depuis 1896 d'un traitemnt de la tuberculose humaine. Deux caractéristiques présentées:

1. Produit employé.
2. Façon d'appliquer ce produit.

Le produit est le liquide obtenu en filtrant, à travers un filtre de porcelaine, une culture du bacille de la tuberculose humaine; venue sur bouillon peptonisé et glycériné et arrivée à son plein développement. Emploi du produit B. F. (bouillon filtré) sans aucune modification, ni par agents physiques (chaleur, précipitation), ni par agents physiques capables de l'altérer. Produit équivalent aux toxines diphtériques et tétaniques d'où viennent les sérums antidiphtériques et antitétaniques.

Dose convenable de B. F. injecté sous la peau des tuberculeux produit des phénomènes analogues à ceux des tuberculines en général:

1. Phénomènes cutanés: inflammation du niveau de la piqûre.
2. Phénomènes géneraux: élévation de la température énervement, malaise, lassitude, perte d'appétit, etc.
3. Phénomènes spécifiques ou de foyer; récrudescence des symptômes particuliers ou apparition de nouveaux symptômes. Grande variation de la dose nécessaire pour produire ces symptômes. Réactions marquées obtenues chez des sujets très sensibles avec 0.0001, 0.00001, 0.000001 gm. et même avec moins.

L'auteur est convaincu de la possibilité de guérir la tuberculose humaine au moyen de B. F., par une vraie immunisation du malade en s'efforçant d'arriver à faire tolérer par le malade de hautes doses de B. F. 0.1—9.5 et même 1 c.c. sans troubler sa santé de façon appréciable.

Dans les autres méthodes les réactions sont tolérées et même encouragées. L'auteur est convaincu de la nécessité d'éviter toutes les réactions fortes ou modérées pour immuniser un malade contre la tuberculose et de tolérer, exceptionnellement, les réactions légères seules. Il considère comme nuisibles et dangereuses les réactions modérées ou fortes, et même les réactions légères trop fréquemment produites.

Règles pour réaliser ce principe général:

1. Commencer par une dose très-petite, 0.00000005 à 0.0000001 gm. chez les tuberculeux afébriles, 0.000000005 à 0.000000001 gm. chez les tuberculeux même légèrement fébriles.

2. Ne jamais injecter pendant une réaction, ni au moment où elle finit.

3. Laisser entre la fin d'une réaction et l'injection suivante un intervalle de un à plusieurs jours.

4. Ne jamais augmenter la dose, s'il y a aucune réaction. Diminuer la dose si la réaction est un peu forte.

En suivant ces règles, on arrive à faire tolérer, sans réaction, sans malaise 1 c.c. de B. F. pur, c'est-à-dire une dose vingt millions et deux milliards de fois plus forte que les doses indiquées plus haut pour commencer le traitement.

Variation considérable des individus à s'habituer au B. F. En général, l'adaptation et l'amélioration marchent de pair. L'auteur est convaincu de l'impossibilité de méconnaître l'efficacité du traitement par B. F.

Pour le développement de ces vues l'auteur renvoie à son livre publié en 1905, intitulé: "L'action curative du bouillon filtré du bacille de la tuberculose de l'homme dans la tuberculose humaine."

Depuis lors, sa conviction, partagée par beaucoup de confrères, dont un certain nombre ont publié leurs résultats, s'est consolidée et il déclare que le B. F. est un agent curatif très efficace de la plupart des formes de la tuberculose, surtout au commencement de la maladie.

Pour la tuberculose pulmonaire, l'auteur avance les propositions suivantes, appuyées sur son expérience de 12 années:

1. Guérison presque certaine dans la tuberculose pulmonaire fermée.

2. Dans la tuberculose pulmonaire ulcérée afébrile, l'infection se trouve en général enrayée et la guérison est d'autant plus complète que les lésions étaient moins avancées.

3. Dans les cas restant longtemps fébriles, diminution des chances de guérison à cause de l'élévation et la tension de la fièvre et l'étendue des lésions.

4. Dans la période hectique, les chances sont faibles.

Forte proportion de guérisons par B. F. dans les pleurésies, laryngites, entérites, péritonites, adénites, ostéites, arthrites, cystites, etc.

Impuissance de B. F. dans les formes rapides ou galopantes, le temps manquant pour immuniser le malade.

Le traitement au B. F. n'exclut aucun autre mode de traitement. Il est absolument inoffensif, même dans les cas fébriles, à condition que les règles exprimées plus haut soient observées.

Filtrierte Brühe des Bazillus der menschlichen Tuberkulose als Heilmittel bei tuberkulösen Affektionen beim Menschen.—(DENYS.)

Erfahrungen seit 1896 einer Behandlung der menschlichen Tuberkulose, welche zwei Charakteristica aufweisen.

Erstens, das verwendete Produkt.

Zweitens, die Art, dieses Produkt zu verwenden.

Das Produkt ist die Flüssigkeit, die man erhält, wenn man durch einen Porzellanfilter eine auf peptonisierter und glycerinisierter Bouillon gewachsene und zu ihrer vollen Entwicklung gebrachte Kultur des Bazillus der menschlichen Tuberkulose durchfiltriert. Anwendung des Produktes B. F. (filtrierte Brühe) ohne irgend eine Modification entweder durch physikalische Agentien (Hitze, Präcipitation) oder durch Agentien, die im Stande sind, es zu verändern.

Das Produkt ist den diphtherischen und Tetanustoxinen gleichwertig, von welchen anti-diphtheritisches und anti-Tetanus-Serumge wonnen werden. Passende Dosen von B. F., die unter die Haut tuberkulöser Patienten injiziert werden, rufen Erscheinungen hervor, die jenen des Tuberkulins im allgemeinen ähnlich sind, nämlich:

1. Kutane Erscheinungen, Entzündung an der Einstichsöffnung.

2. Allgemeine Erscheinungen, Temperatursteigerung, Nervosität, Übelbefinden, Schwäche, Appetitverlust, etc.

3. Specifische Erscheinungen, Rückkehr der allgemeinen oder Auftreten neuer Symptome.

Grosse Verschiedenheit in der Dosis notwendig, um diese Symptome hervorzurufen. Markierte Reaktionen erhalten in sehr empfindlichen Individuen mit 0.0001, 0.00001, 0.000001 gm. und sogar weniger.

Der Autor ist von der Möglichkeit, menschliche Tuberkulose durch Anwendung des B. F. zu heilen, überzeugt, wenn man den Patienten vollständig immunisiert und Erfolg hat dadurch, dass grosse Dosen von B. F. (0.1 bis 0.5 und sogar 1). vom Patienten vertragen werden ohne seine Gesundheit in bemerkenswerter Weise zu schädigen.

Bei anderen Methoden werden Reaktionen vertragen und es wird dazu ermutigt. Der Autor ist von der Notwendigkeit überzeugt, dass alle starken und mässigen Reaktionen zur Immunisierung eines Patienten gegen Tuberkulose vermieden werden sollen, und dass nur gelegentliche leichte Reaktionen vertragen werden. Er betrachtet mässige oder starke Reaktionen

oder sogar leichte, die zu häufig hervorgerufen werden, als schädlich und gefährlich.

Vorschriften, diese allgemeinen Grundsätze in der Praxis anzuwenden:

1. Man beginne mit einer sehr kleinen Gabe, 0.00000005 bis 0.0000001 gm. für fieberfreie tuberkulöse Patienten; 0.000000005 bis 0.000000001 gm. für sogar leicht fiebernde.

2. Man injiziere nie während einer Reaktion, noch wenn sie gerade endet.

3. Man lasse einen Intervall von einem zu mehreren Tagen zwischen dem Ende einer Reaktion und der folgenden Injektion.

4. Man steigere nie die Gabe, wenn was immer für eine Reaktion vorhanden sei. Man vermindere die Gabe, wenn die Reaktion überhaupt stark ist.

Wenn wir diese Vorschriften befolgen, erreichen wir es, ohne Reaktion oder Unbequemlichkeit eine Gabe von 1 c.c. des puren B. F. zu geben, welche zwanzig Millionen und zwei Billionen mal stärker ist, als die oben für den Beginn der Behandlung angegebene Dosis.

Ueberlegte Veränderung in den Individuen, wenn man sie an B. F. gewöhnt. Im allgemeinen geht ihre Anpassungsfähigkeit und Besserung Hand in Hand. Der Autor ist von der Unmöglichkeit überzeugt, dass die Wirksamkeit der B. F. Behandlung nicht anerkannt werden sollte. Der Autor weist für die Entwicklung dieser Ansichten auf sein 1905 veröffentliches Buch hin, betitelt: "Die heilende Wirkung der filtrierten Brühe des Bazillus der Tuberkulose des Menschen in menschlicher Tuberkulose." Seit damals hat seine Überzeugung zugenommen, welche von vielen seiner Mitbrüder geteilt wird, von denen eine grosse Anzahl ihre Resultate veröffentlicht haben und er erklärt, dass B. F. ein ausserordentliches Mittel zur Heilung für die meisten Formen der Tuberkulose besonders beim Beginne der Erkrankung sei. Für Lungentuberkulose macht der Autor folgende Vorschläge, die auf einer Erfahrung von 12 Jahren begründet sind:

1. Eine beinahe sichere Heilung in abgeschlossener Lungentuberkulose.

2. In fieberfreier Lungentuberkulose mit Geschwürsbildung ist die Infektion im allgemeinen hinangehalten und je weniger die Verletzungen vorgeschritten sind, desto vollständiger ist die Heilung.

3. In Fällen, die eine lange Zeit hindurch febril bleiben, ist eine Verminderung der Aussichten auf Heilung vorhanden, mit Rücksicht auf die Höhe und Ausspannung des Fiebers und die Ausdehnung der Verletzungen.

4. In der hektischen Periode sind die Aussichten schwach. Eine grosse Verhältniszahl von Heilung durch B. F. in Pleuritis, Laryngitis, Enteritis, Peritonitis, Adenitis, Osteitis, Arthritis, Cystitis, etc.

B. F. versagt in rapiden oder gallopierenden Fällen, da der Mangel an Zeit keine Immunisierung des Patienten zulässt.

Die Behandlung mit B. F. schliesst andere Formen der Behandlung nicht aus. Es ist durchaus nichts dagegen einzuwenden, wenn selbst in febrilen Fällen die oben erwähnten Vorschriften befolgt werden.

TUBERKULINKUREN UND TUBERKULINPROBEN.

Sanitätsrat Dr. Med. E. Meissen,
Leitender Arzt des Sanatoriums Hohenhonnef.

Leitsätze.

1. Das Tuberkulin kann als ein erwiesenes direktes oder spezifisches Heilmittel der Tuberkulose nicht betrachtet werden. Der Beweis für eine solche Wirkung steht aus, trotz der verwirrend grossen Zahl verschiedener Tuberkuline, von denen jedes das beste zu sein behauptet und zu denen auch immer wieder neue hinzutreten und trotz der Mannigfaltigkeit der Methoden ihrer Anwendung. Die grundlegenden Tierversuche sind ungenügend oder finden bei Nachprüfung keine Bestätigung. Die Erfolgs-Statistiken der Tuberkulinverehrer sind fast sämmtlich zu summarisch, sie ermangeln der Grundlage einer klaren Einteilung in Stadien oder klinische Gruppen. Ferner wird meist ganz übersehen, dass ohne Tuberkulin, allein durch klimatisch-hygienisch-diätetische Behandlung die gleichen Erfolge erzielt werden. Einzelne Fälle von angeblich besonderen Heilwirkungen des Tuberkulins sind keine Beweise, weil auffallende Erfolge bei jeder anderen Methode ebenso angegeben werden. Dies alles gilt besonders von der Lungentuberkulose.

2. Zwei Wirkungen, welche von Tuberkulin ausgehen: eine gegen den Tuberkelpilz und seine Toxine immunisierende, und eine hyperämisierende auf die Umgebung der tuberkulösen Herde, auf das "tuberkulöse Gewebe" R. Kochs. Die immunisierende Wirkung muss als durchaus zweifelhaft und unerwiesen bezeichnet werden. Man erreicht, um eine immunisierende Wirkung oder Abstumpfung gegen das betreffende Tuberkulin, nicht einmal gegen ein anderes Tuberkulin, eine Eigenschaft, deren Nutzen für den Kranken in keiner Weise ersichtlich ist. Anerkannt erwiesen ist dagegen die genannte hyperämische, anregende Tuberkulinwirkung.

3. Ob das Tuberkulin irgendwie zu Heilzwecken sich erhalten wird, hängt von weiteren Versuchen ab. Seine Verwendung erfordert grosse Vorsicht und sorgfältige Ueberwachung, wie sie im allgemeinen nur in Krankenhäusern und Anstalten möglich ist. Die Anwendung in der allgemeinen Praxis ist durchaus zu widerraten. Wo doch die nötigen Vorbedingungen gegeben sind, sollte sie zuerst nur in ausgewählten, nicht zu weit vorgeschrittenen Fällen versucht werden, d. h. in Fällen, deren Verlauf

man durch genügende Beobachtung genau kennt, und wo der Erfolg der sonst üblichen Behandlung zu stocken scheint, nach einem Verfahren, das auf die streitige immunisierende Wirkung und damit auf die Erreichung bedenklicher hoher Dosen verzichtet und nur auf die zweifellos vorhandene hyperämisierende anregende Einwirkung an den tuberkulösen Herden sich stützt, wodurch Beziehungen zu der Bier'schen Stauung gewonnen werden oder zu der Behandlung schlecht heilender Wunden mit leicht reizenden Salben u. dgl. Man muss mit sehr geringen Mengen, am besten Koch'schem Alt-Tuberkulin $\frac{1}{1000} - \frac{1}{100}$ mgm. beginnen, jede wesentliche Fiebererregung vermeiden und sich durch genaue Beobachtung der sonstigen Wirkungen und des Verlaufes leiten lassen, wie rasch und wie hoch man steigt. Mässige Fieberhaftigkeit eines zu behandelnden Falles ist keine unbedingte Kontraindikation. Es scheint, dass man auf dieser Weise gelegentlich zum Erfolge beitragen kann, zu bestimmtem Urteil ist aber schwer.

4. Um zu einem richtigen Verständnis der Entstehung der Tuberkulose zu gelangen, müssen wir uns gewöhnen, Zeichen tuberkulöser Infektion und tuberkulöser Erkrankung zu unterscheiden. Gegen die Invasion des in allen Kulturländern ausserordentlich verbreiteten und schwerlich aus einer einheitlichen Quelle stammenden Erregers der Tuberkulose vermag sich der menschliche Organismus nicht zu schützen. Es ist auch wohl müssig, über die Eingangspforten zu streiten, da deren viele vorhanden sind und auch benützt werden. Der Erreger findet beim Menschen überall die "offene Tür." Er kommt aber hiedurch für gewöhnlich nicht zu einer eigentlichen Erkrankung, sondern nur zur Bildung kleiner Herde in den Drüsen, den eigentlichen Schutzorganen gegen die Tuberkulose, oder in deren Nachbarschaft, die wieder vergehen können, in denen sich aber der Tuberkelpilz lange, oft sehr lange Zeit in latentem Zustande erhalten kann. Die tuberkulöse Infektion in diesem Sinne ist ausserordentlich verbreitet. Die Sektionsergebnisse der pathologischen Anatomie und übereinstimmend die Ergebnisse gewisser Tuberkulinproben erweisen übereinstimmend, dass mindestens 50–60% auch der Gesunden tuberkulös infiziert sind. Die tuberkulöse Infektion darf nicht einem Inkubationsstadium gleichgesetzt werden, sie ist vielmehr ein Zustand, der zu einer tuberkulösen Erkrankung führen kann, aber nicht führen muss. Zur tuberkulösen Erkrankung kommt es für gewöhnlich erst durch die Einwirkung *auslösender Momente*, die teils in konstitutionellen Verhältnissen zu suchen sind, teils auf die äusseren Lebensbedingungen—Wohnung und Beruf, schädliche Gewohnheiten und gesundheitliche Missbräuche, gewisse Krankheiten, traumatische Einflüsse—zurückgehen. Die Abnahme der Tuberkulose-Sterblichkeit in England und Deutschland beruht nicht auf einer Abnahme der tuberkulösen Infektion, sondern auf einer Verringerung der tuberkulösen Erkrankung in Folge der so viel hygienischeren Fortschritte, die zweifellos gewisse auslösende Momente

zurückgedrängt haben. Die allgemeine Wohlfahrtspflege und damit im Zusammenhang die spezielle Hygiene der Tuberkulösen, wie sie in den Anstalten und den Fürsorgeanstalten erstrebt werden, dürfen in diesem Sinn als spezifische Heilmittel der Tuberkulose bezeichnet werden.

5. Wir kennen bis jetzt drei brauchbare Tuberkulinproben: die subkutane Tuberkulinprobe nach R. Koch, die kutane nach v. Pirquet, und die konjunktivale nach Wolff-Eisner. Ueber ihre Verwendung ist folgendes zu sagen:

Die subkutane Tuberkulinprobe ist ein sehr feines Reagens sowohl für die tuberkulöse Infektion wie für die tuberkulöse Erkrankung. Die fieberhafte Allgemeinreaktion zeigt sich bei etwa 90% der klinisch Tuberkulösen und schon bei 60% der Gesunden, z. B. bei den Soldaten eines bosnischen Regiments in Wien nach Franz. Sie ist nicht ganz ungefährlich. Für die klinische Diagnose eignet sie sich nur in solchen Fällen, in denen die auftretende lokale Reaktion dem Auge (Haut, Kehlkopf, etc.), oder allenfalls dem Ohr (Zunge) zugänglich ist. In letzterem Falle ist aber das Hervorrufen einer lokalen Reaktion keineswegs unbedenklich.

Die kutane Tuberkulinprobe steht an Empfindlichkeit der subkutanen kaum nach. Zu rein klinischen Zwecken ist sie noch weniger brauchbar als die subkutane, weil sie gar nichts über den Ort der Erkrankung aussagt, sondern nur die Tatsache bestätigt, dass der betreffende Organismus tuberkulös infiziert oder erkrankt ist. Es ist überhaupt nicht recht verständlich, weshalb man die Verwendung der Tuberkulinproben zu klinisch diagnostischen Zwecken bei Lungentuberkulose hervorhebt. Hiezu sind sie offenbar schlecht geeignet und auch überflüssig, weil die sonstigen klinischen Hülfsmittel doch entscheiden müssen und allermeist auch völlig ausreichen. Dagegen eignet sich die kutane Tuberkulinprobe wegen ihrer grossen Empfindlichkeit durch ihre völlige Gefahrlosigkeit und die Einfachheit ihrer Ausführung ganz besonders zur Untersuchung der Verbreitung der tuberkulösen Infektion, um die Ergebnisse der pathologischen Anatomie zu ergänzen und richtigere Vorstellungen über die Entstehung der Tuberkulose zu begründen.

Die konjunktivale Tuberkulinprobe ist bei richtiger Ausführung ganz unbedenklich; wir sahen niemals bedenkliche oder auch nur besonders lästige Wirkungen. Sie ist viel weniger als die beiden anderen Proben, da sie bei Gesunden nur in etwa 15% der Fälle auftritt. Dagegen eignet sie sich bei tuberkulös Erkrankten, d. h. bei klinischer Tuberkulose anscheinend zu prognostischen Zwecken, d. h. zur Beurteilung der Widerstandsfähigkeit des erkrankten Organismus. Fehlende oder sehr schwache Reaktion bei manifester Lungentuberkulose ist von übler Vorbedeutung; positiver, namentlich mässig starker Ausfall der Reaktion bedeutet mit grosser Wahrscheinlichkeit, dass der Organismus noch kampffähig ist und

mit Unterstützung der sonstigen hygienisch-diätetischen Massnahmen vielleicht zum Siege gelangen kann. Bei weiterer Bestätigung dieses Verhältnisses würde die Wolff-Eisner'sche Augenprobe ein wertvolles Hilfsmittel auf dem schwierigen Gebiete der Diagnostik der Lungentuberkulose abgeben.

Tuberculin Treatment and Tuberculin Tests.—(MEISSEN.)

It is not proved that tuberculin has a specific curative action. Neither animal experiments nor the results obtained in man justify such a conclusion. The bewildering mass of new tuberculins and the constantly growing number of methods of application are sufficient proof that the question is still open, and that further experiments are necessary. The patient must be kept under the most careful supervision during the treatment with tuberculin. This is possible only in hospitals and institutions; hence the method is not suitable for general practice.

In judging the value of the tuberculin tests, you must distinguish between tuberculous infection, *i. e.*, the formation of small latent foci, which is exceedingly common even in healthy individuals, and tuberculous disease which manifests itself by clinical symptoms in the lungs. The old subcutaneous tuberculin test after R. Koch is a very delicate reagent, both for tuberculin infection and tuberculous disease. It is not quite without danger and is too delicate for clinical diagnosis in general, and should be employed only in cases in which the local reaction can be observed. V. Pirquet's cutaneous tuberculin test, which is very simple and free from danger, is hardly less sensitive than the subcutaneous reaction. In doubtful cases it is even less suitable for clinical diagnosis than the former. It is, however, of value in studying the spread of tuberculous infection, and confirms the results of pathology. The conjunctival test after Wolff-Eisner is quite safe if properly carried out. It appears to be of some value in determining the prognosis; or, in other words, judging the resistance of the tuberculous organism. Absence of reaction, or a very feeble reaction in the presence of manifest tuberculosis, is a bad prognostic sign; while a positive reaction very probably indicates that the organism is still capable of fighting the disease, and if supported by hygienic, dietetic, or climatotherapeutic measures, may gain the victory.

El Tratamiento de la Tuberculina y la Prueba de la Tuberculina.—(MEISSEN.)

Aun no se ha probado que la tuberculina tiene propiedades curativas especificas. Ni los esperimentos en los animales ni los resultados en el

hombre justifican tales concluciones. Las variedads de tuberculinas y el constante aumento en el numero de los métodos de las aplicacións de ésta, es una prueba evidente de que el problema aun está pendiente y que más experimentos sobre este punto se necesitan para llegar a una verdadera conclusión. El paciente debe ser observado cuidadosamente durante el tratamiento de la tuberculina. Este modo de tratamiento es posible solamente en los hospitales; por lo tanto el método no es apropiado para la práctica en general.

À fin de judzgar sobre el valor de la prueba de la tuberculina, uno debe hacer las distinciones de la infección tuberculosa, esto es, la formación de pequeños focos latentes, que es muy común aun en los individuos sanos, y en la afección tuberculosa del pulmón que se manifesta por medio de los sintomas clínicos. La inyeccion subcutanea de la tuberculina recomendada por Koch, es un procedimiento delicado, tanto en la infección tuberculosa como en las enfermedades tuberculosas, este no es del todo sin peligro y es demasiado delicado para ser usado en el diagnóstico clínico en general; deberá emplearse solamente en los casos en los cuales la reacción local puede ser observada. La reacción cutánea, recomendada por von Pirquet, la cual es muy simple y libre de peligro, es escasamente menos delicada que la reacción subcutánea. En los casos dudosos está es aun menos apropiada que la reacción subcutánea en el diagnóstico clínico. Estâ es, sinembargo, de valor en el estudio de la estensión de la infección tuberculosa, y confirma los resultados patológicos. La prueba de la conjuntiva recomendada por Wolff-Eisner, es sin peligro cuando ésta es aplicada con cuidado. Esta parece tener algún valor en la determinación del pronóstico, ó en la determinación de la resistencia del organismo tuberculoso. Ausencia de la reacción, ó una reacción ligera en los casos de tuberculosis manifestada, indica una mal pronóstico; mientra que una reacción positiva indica probablemente que el organismo es aun capaz de luchar contra la enfermedad, y que si el paciente es puesto bajo condiciones favorables, tales como medidas higienicas, buena alimentación, un clima apropiado, etc., este podra llegar a vencer la infección.

La Traitement et les Épreuves par la Tuberculine.—(MEISSEN.)

Ce n'est pas démontré que la tuberculine a une action spécifique, curative. Ni les expériences sur les animaux ni les résultats chez l'homme ne justifient de telles conclusions. Nous sommes embrouillés par la quantité de tuberculines nouvelles et par l'augmentation continuelle des méthodes d'application. Ces constatations démontrent suffisamment que la question est encore à résoudre et qu'il faut continuer les expériences. Pendant le traitement à la tuberculine il faut surveiller le malade avec le plus grand

soin. Cette surveillance n'est possible que dans les hôpitaux et les maisons spéciales, de sorte que la méthode ne convient pas au médecin praticien.

Pour estimer la valeur des épreuves de la tuberculine il faut faire la distinction entre l'infection tuberculeuse (c'est-à-dire la formation des petits foyers latents, chose banale même dans les individus sains) et la maladie même, qui se montre par les symptômes cliniques. La vieille épreuve de la tuberculine après R. Koch, est un réagent très-délicat de l'infection, comme de la maladie tuberculeuse. Elle n'est pas tout-à-fait sans danger, et en général elle est trop délicate pour l'usage clinique. On ne doit s'en servir que dans les cas dont on peut observer les réactions locales. L'épreuve cutanée, ou la réaction de v. Pirquet, est très-simple et indemne de danger, et à peine moins délicate que la réaction sous-cutanée. Dans les cas incertains elle est même moins adaptée à l'usage clinique que la précédente. Elle est, cependant, de valeur dans l'étude de la propagation de l'infection tuberculeuse, et pour affirmer les résultats de la pathologie. La réaction conjonctivale, après Wolff-Eisner, est sans danger, si elle est bien dirigée. Elle paraît avoir quelque valeur pour constater le pronostic, ou, en d'autres termes, pour estimer la résistance du sujet. L'absence de la réaction, ou une très-faible réaction, étant donné la tuberculose avérée, est un signe de mauvais pronostic; tandis que la réaction positive signifie très-probablement que l'organisme est encore capable de combattre la maladie et peut emporter la victoire, pourvu qu'il est soutenu par les moyens hygiéniques, diététiques, ou climatothérapeutiques.

HUMAN AND BOVINE TUBERCULOSIS, WITH SPECIAL REFERENCE TO TREATMENT BY DIFFERENT KINDS OF TUBERCULIN.

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In the year 1903 I made a communication to the British Medical Journal in which I stated that tubercle bacilli of bovine origin had been isolated by me from lesions in the human body. At almost each successive meeting of the British Medical Association I have had the opportunity of putting forth my views on the relationship between human and bovine tuberculosis, and the part played by infected milk in the production of tuberculosis in the human body.

In 1903 I expressed the view that the two forms of tubercle were different varieties of a common species, and that the doctrine of the unity of tubercle could not be maintained. The result of a very extensive study, both clinical and pathological, since that time has served only to strengthen my views, although, of course, I have not been able to produce absolute scientific proof, since the human body can never be used for purposes of experiment.

To summarize the case very briefly: Koch enunciated the view in 1901 that human and bovine tuberculosis were different diseases, and that bovine tuberculosis could not be conveyed to the human. The most elaborate and exhaustive experiments conducted by different observers throughout the world have served only to show that the great master was wrong in his contention that bovine tuberculosis could not be conveyed to the human. On the other hand, they have successfully shown, beyond all reasonable doubt, that tuberculosis must be classified according to its origin, and that human and bovine tuberculosis must be considered as different varieties.

I will not enter here into the description and result of innumerable experiments that have been made with a view to solving the intricate problem. In my opinion, they have settled the broad question of the difference between the two forms, and have also settled for all time the more important fact that tubercle bacilli of bovine type are able to set up numerous lesions in the human body.

Hitherto it has been assumed that all tubercle bacilli recovered from the human body are necessarily of human origin, but this is certainly not so, and the Royal Commissions have shown that from 12 to 20 per cent. of tuberculous lesions in the human body are produced by bacilli of the bovine type.

I would venture to suggest that in children, during the milk-drinking period, even a larger percentage of tuberculous lesions will ultimately prove to be of bovine origin.

The methods by which the different bacilli can be differentiated are, we must admit, not wholly satisfactory. Some observers admit cultural and morphological differences; others place reliance on the appearance of the bacilli themselves, whereas others, like Theobald Smith, trust to a degree of alkalinity for their distinction.

The most scientific method, however, and one that is not at all free from error, is that suggested by Koch, namely, the susceptibility of animals to inoculation. The main consideration in these experiments is one of virulence, and, as all observers know, we may find bacilli of a high virulence that will give positive results, whereas bacilli of low virulence will give slight or even negative results, so that a tuberculous lesion that is in process of healing in the human body may give very little reaction when inoculated into a bovine; hence we must take into consideration the fact that the virulence of tubercle bacilli is one of extraordinary variety. In some instances even an apparently trifling tuberculous lesion in the human body will set up, when injected into a bovine, the most virulent tuberculosis, whereas, on the other hand, an apparently acute lesion will prove to be of very low virulence for animals, so that we cannot accept definitely the origin of a tuberculous affection purely and simply as the result of inoculation into bovines. In my judgment more will be done in the way of solving the intricate problem as to how much tuberculosis is caused in the human body by bovine infection by a prolonged and careful clinical examination of the different lesions set up in the human body, and by most careful pathological and bacteriological examinations after death.

I would like to follow the lines of my original paper of 1903, since I have no reason to modify the view then set forth; namely, that human and bovine bacilli are divisible into two distinct types of a common species:

First—Typus humanus.

Second—Typus bovinus.

Long-continued residence in a particular host has resulted in the bacilli assuming characteristics that serve to distinguish it from others, and the fact that tubercle bacilli have lived for thousands of years in human lungs would be ample evidence for assuming a difference between them and bacilli that have lived for centuries in cattle. Man has been accustomed to feed upon

cattle and their products—milk, butter, cheese, etc.—for centuries, and in this way the human body has become tolerant to bovine tubercle bacilli.

Clinical Distribution of Tuberculous Lesions.

The views that I venture to lay before you to-day are based on an observation of over 4000 cases of pulmonary tuberculosis and over 1600 cases of so-called surgical tuberculosis, all having come under my care in the Mill Road Infirmary.

In addition to this exceptional opportunity for clinical experiences I have made over 1600 autopsies on tuberculous cases, the great majority of which were most carefully investigated.

The theory that I placed before you in 1903, and which further observation only tends to confirm, is briefly as follows:

"That tuberculous lesions affecting the human body must be divided into two great groups, according to their origin, and that the true example of human infection is pulmonary tuberculosis." In other words, man is susceptible to both forms of the disease.

Bacilli of *Typus humanus produce:*

Pulmonary tuberculosis.
Tuberculous laryngitis.
Secondary intestinal ulceration.

Bacilli of *Typus bovinus produce:*

Tuberculosis of mesenteric glands.
" " peritoneum.
" " lymph-glands.
" " bones and joints.
" " meninges.
" " skin (lupus).
" " genito-urinary apparatus.
" " middle ear.
Acute miliary tuberculosis.

Methods of Infection.

From my observation of a large number of cases both antemortem and postmortem I would say that the lungs may be infected in one of four ways: (1) By direct inhalation of tubercle bacilli. (2) By downward infection from cervical lymph-glands. (3) By upward infection from abdomen through diaphragm to bronchial glands (lymphatic). (4) By blood-stream, as acute miliary tuberculosis.

It is of the greatest importance to bear in mind that the lungs may be seriously infected—and *are*, in a great many cases—by tubercle bacilli of bovine type, causing much more rapid destruction of lining tissue than in

ordinary pulmonary tuberculosis, which is, as a rule, a slow and chronic disease.

It is absolutely impossible to decide whether or not, in ordinary phthisis, the bacilli reach the lungs by the air-passages or through the digestive tract, but in my opinion the presumption and evidence is overwhelming in favor of aërial infection due to the inhalation of dried sputum in overcrowded and badly ventilated dwellings, or by direct contact with consumptive persons in ordinary family life, and especially by kissing.

A slight tuberculous infection of the lungs or abdomen may lie dormant for many years, or spread very slowly, so that it is impossible to say exactly at what time the infection occurred.

The theory put forward by Calmette and others that intestinal infection is the rule cannot be maintained, for why should the bacilli take so roundabout a journey to reach the lungs, and then, by a curious process of selection, remain *only* in the lungs, without infecting other parts of the body? for we all know that the intestines are only secondarily infected by the swallowing of sputum at a later stage of the lung disease.

Postmortem examination of cases of pulmonary tuberculosis are remarkable in this respect that the tuberculous process in the great majority of cases is strictly limited to the lungs, and the most careful search will fail to discover any other deposit of tubercle. In a small proportion of cases the larynx is extensively involved, and when this is the case, there is invariably extensive secondary ulceration of the intestines. We must look upon the lungs, then, as the natural habitat of tubercle bacilli of the human type, producing what is called consumption, a disease that has, unfortunately, been in our midst for thousands of years, and which will be stamped out only by education, improved dwellings, and destruction of sputum, as well as by the advances of sanitary science. In Vienna, when attending the pathological department of the hospital, I was impressed with the fact that deaths from phthisis pulmonalis were not examined, as there was nothing to observe except the lungs and the intestines. Now, if all tuberculous lesions were caused by one identical bacillus, why should the lungs be so constantly affected in one form of the disease, and other parts of the body in another form, the lungs in the latter form being generally exempt?

I maintain that phthisis pulmonalis is in a class by itself, that it is caused by the typus humanus, that it does not attack the other viscera, and that practically all other tuberculous lesions are the result of infection generally in infancy through the digestive intestinal tract, by milk and other food-products containing bovine bacilli.

I cannot here discuss the clinical distribution of tubercle, but having postulated my theory, I will say a few words in regard to the more important question of its bearing upon treatment.

From a long and extensive experience I am a firm believer in treatment by tuberculin; but different forms of the disease require different varieties of tuberculin.

I have long ago come to the conclusion that ordinary cases of phthisis pulmonalis are not benefited by Koch's tuberculin (either old or new), which is, as you know, prepared from human tubercle bacilli.

Von Behring and Römer have done splendid work in the immunization of cattle against bovine tuberculosis, but they have come to the conclusion that it is impossible to produce even a slow immunity by injecting small doses of tubercle bacilli of the bovine type, and that they can produce complete and lasting immunity by injecting cattle with bacilli of the human type.

Working on the hypothesis that the human body is attacked by two varieties of tubercle that may be present in the body at the same time, and which, generally speaking, are antagonistic to each other, I have devoted the last few months to the preparation of tuberculins for the treatment of these different lesions. After a fairly complete experience I have come to the conclusion that Koch's tuberculin R has little or no healing effect in phthisis pulmonalis, and when we remember that it is manufactured from human tubercle, if my theory is correct, it is just what we should expect. Consequently, I have prepared from one of my own pure cultures from bovine sources a special tuberculin for the treatment of phthisis pulmonalis. The tuberculin was made from a typical culture of "Perlsucht," and was very carefully sterilized and standardized. Several guinea-pigs were inoculated, but without any ill effect.

Working on these lines, I am at present treating over 70 cases of surgical or bovine tuberculosis in the wards of Mill Road Infirmary with Koch's tuberculin R, commencing with very small doses and slowly increasing them until a maximum dose of $\frac{1}{100}$ milligram is reached. The results, without any additional treatment, have been successful beyond my anticipation. Enlarged glands, joints, and lupus have been greatly improved, discharging sinuses have cleared up, and in two cases the symptoms of tuberculous meningitis associated with tuberculous peritonitis disappeared entirely. On the other hand, I have treated 25 cases of early phthisis, 6 of which were associated with hemoptysis, and all of which showed tubercle bacilli in the sputum, with distinctive physical signs at one apex, with the tuberculin prepared from a pure culture of bovine tubercle (kindly supplied me by Calmette, of Lille). These cases are still under treatment, but up to the present many of them have shown marked improvement, with total disappearance of physical signs. It is too soon yet to speak of the final results of treatment. My tuberculin should be used only in early cases, and, if possible, in conjunction with open-air sanatorium treatment. The

directions and dosage as issued by the Clinical Research Association should be strictly adhered to if good results are to be obtained.

With a view to producing immunity against human tubercle in children, especially in those who have been exposed to infection from a consumptive father or mother, I have recently been working with the serum of tuberculous cattle. I have purchased several dairy cows suffering from tuberculosis of the udder, and, with the kind coöperation of Professor H. E. Annett, have obtained a large amount of the serum of these cows. This serum has been very carefully sterilized and injected into guinea-pigs without any ill effects. I believe that the serum of a cow that has suffered from bovine tuberculosis will confer such immunity when injected into a child as will suffice to protect him against an attack of human tuberculosis. Considering the large number of children who are attacked by phthisis pulmonalis as the direct result of contact with a consumptive parent, a protective serum would be an immense step in the direction of stamping out consumption. In any case the serum is quite harmless, and will be used only with the full consent of those parents whose children have been exposed to infection.

I have recently been using small prophylactic doses of bovine tuberculin in children whose parents have died of phthisis, with the object of producing an immunity against pulmonary tuberculosis. Eleven children have been inoculated without the slightest reaction, but, of course, it is too soon to consider results.

Methods of Treatment.

It is preferable, though not necessary, that the patient remain in bed for a few days before and after the first injection. The temperature and pulse should be noted every four hours before treatment, and if the former is not above 100° F. at any time, the first injection of 0.0001 milligram may be given under the skin, with, of course, the strictest aseptic precautions. The temperature and pulse should be taken every two hours afterward for twenty-four hours, and then every four hours for forty-eight hours more. If any reaction is going to take place, the temperature will rise to 100° or 101° F. within the first twelve hours, or even later; but experience has shown that if the injections are commenced with such a small dose and slowly and gradually increased, no reactions follow, and beyond an occasional slight headache or sick feeling, no disagreeable symptoms are observed. In fact, many patients visit the consulting room for their injections every week, and continue their ordinary duties in the interval without any personal inconvenience. The second injection of 0.0002 milligram is given after an interval of one week, provided no reaction has followed the first injection, in which case the first injection is repeated and then doses (in milligrams) in the following order are given: 0.0004, 0.0005, 0.001, 0.002, 0.0025, 0.003,

0.004, 0.005, 0.0075, and 0.01 (maximum dose), making in all twelve injections. If the patient requires further injections, the last injection of 0.01 milligram is repeated for a few more doses, but that dose is never exceeded. After the first two or three injections the patients feel better, the temperature drops to normal, the appetite is improved, and there is a feeling of general improvement. Not the slightest bad effect has been observed from the injections, but great care must be exercised in the technic and a careful watch must be kept on the patient during the course.

Phthisis Pulmonalis.

I have treated 27 cases of pulmonary tuberculosis with injections of bovine tuberculin with, so far, the most satisfactory results. In 23 cases the disease was in the early stages, but in 4 cases it was well advanced, and yet the benefit was great, two of the patients being apparently well, with total disappearance of physical signs and tubercle bacilli from the sputum.

From this series of cases of phthisis pulmonalis, the results of which I will publish later, I am convinced, beyond a shadow of doubt, that the tuberculin prepared from bovine sources has a most marked and curative effect in tuberculous affections of the lung, but my experience teaches me that, first, the patient must have a certain amount of natural resistance to the organism. If this is not present at the time of observation, an endeavor must be made, by feeding and general tonics, to raise the resistance somewhat before the tuberculin treatment is begun. If it is found impossible, with the aid of pure air, nutritious food, blood tonics, etc., to improve the resisting power, I have come to the conclusion that tuberculin itself will not be of much avail. Second, the tuberculous infection must be limited either to one lobe of a lung or to two small areas of two lungs. If the disease has progressed to the formation of cavities and general constitutional infection, tuberculin has little or no lasting effects, although it improves the patient for a time. Third, the age of the patient is of great importance: the younger the patients, the more rapidly do they respond to tuberculin, and I have found that after the age of fifty it is very difficult to get good effects, although it is quite common, of course, to see patients of that age recover from an early infection of tubercle of the lungs. Fourth, if there is any concurrent disease, such as kidney affections, tuberculin seems to have little or no effect.

I intend to continue the treatment for another 100 cases. At present I am quite certain that, under suitable conditions, every early case of phthisis should be inoculated with bovine tuberculin.

Tuberculous Glands.

Forty-two cases of tuberculous glands of the neck and other parts of the body have been treated with tuberculin, with, in many instances, the

most extraordinary results. Several cases of extensive disease, especially when localized in the neck, have completely recovered. First of all it is noticed that the glands become softer, the periadenoid tissue seems to become more flaccid and less inflamed, and the glands themselves rapidly diminish to the vanishing point. I have noticed, however, that where there is a tendency to suppuration, tuberculin has no good effect, and nothing remains to be done but to incise the glands or to remove them altogether. In two instances of inflammatory glands where suppuration was threatening, tuberculin seemed rather to increase than diminish it, so that, from my experience in treating glands, I would say that tuberculin is indicated only where the glands are enlarged and are not caseating or suppurating.

Lupus.

Thirty-eight cases of lupus have been treated in the hospital, and it is here that the very best results of tuberculin treatment are obtained. All stages of the disease seemed to respond rapidly to injections, and in all the cases in which I have used tuberculin without any other treatment, such as scraping or medication, the ulcerated surface has healed with a firm cicatrix, and in only four instances so far has the disease recurred.

Tuberculous Joints.

Thirty-one cases of tuberculous joints, mostly of a chronic or subacute variety, have been inoculated—17 diseases of the knee, 8 of the hip, and 6 of other joints. The cases in which the best results were obtained were those in which there was suppuration or a sinus leading directly down to tuberculous disease. In the great majority of cases the suppuration ceased first and then the sinus closed. In cases of pulpy disease of the joints there was, in many instances, marked diminution of the size of the joints, with absence of inflammation and more movement. I have not yet seen a case in which fixed or ankylosed joints have been benefited.

Tuberculous Peritonitis.

Twelve cases of tuberculous peritonitis have been treated—4 of the plastic or dry variety, and 8 associated with fluid in the abdomen. Every one of the cases recovered and all have been discharged well after having received twelve injections each of tuberculin. I consider that tuberculin is an absolute specific in cases of tuberculous peritonitis confined to the abdomen.

Tuberculous Meningitis.

This, the most terrible of all diseases that we are called upon to treat, may possibly be improved by timely inoculation of tuberculin. Unfortunately,

as a rule, in hospital practice the cases do not come under attention until the disease is well advanced or when there is an intercurrent tuberculous lesion. In three cases of apparent tuberculous meningitis with all the classical signs the symptoms disappeared entirely after four injections of tuberculin, and both children made a rapid recovery. In the other four instances tuberculin had no effect and the children died. Of course, it is impossible to declare that the first two cases were of a tuberculous nature, as tubercle bacilli could not be recovered by lumbar puncture, but I have no doubt that they were.

Tuberculous Abscesses and Sinuses.

Thirty-two cases were treated. In 17 of them no definite good results were obtained, as they were of a chronic nature, but in 5 the sinuses closed and the patients soon grew fat and apparently well.

The whole of these 162 cases of surgical tuberculosis have been treated with Koch's tuberculin R, which is, as you know, manufactured from tubercle bacilli of the human type, and exactly in contradistinction to the cases of phthisis that were treated by bovine tuberculin.

In the great majority of cases of surgical tuberculosis the cause of death is waxy or lardaceous disease of the viscera, and in only a small number of cases does a general miliary tuberculosis close the scene. It is, therefore, of the highest importance to ascertain, before injections are commenced, if lardaceous degeneration is present, for if there is, tuberculin has no good effect.

I would advise practitioners to treat their tuberculous cases with tuberculin at their own homes. If careful precautions are observed, there is no danger whatever, and, from my own experience, the tuberculin is carefully prepared and standardized by the Clinical Research Association at a moderate cost. I have never seen the slightest ill effect or severe reaction follow its use if ordinary care is exercised in giving carefully graduated doses.

SPECIFISCHE BEHANDLUNG DER TUBERKULOSE.

Von Dr. Johannes Petruschky,

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I. Gegenwärtiger Stand der specifischen Behandlung in Deutschland.—*These* 1.—Die Behandlung der Tuberkulose mit den Tuberkulinpräparaten von Robert Koch und mit ähnlichen Präparaten hat sich nach längerer Kontroverse seit etwa zehn Jahren mehr und mehr in Deutschland eingebürgert und zwar nicht nur bei den mit Tuberkulose speciell beschäftigten Aerzten und Polyklinikern, sondern namentlich auch in den Tuberkuloseheilstätten und Privatsanatorien. Die weitaus überwiegende Zahl der Tuberkuloseärzte Deutschlands verwendet gegenwärtig Tuberkulin zur Sicherung der Diagnose und zur Behandlung der Tuberkulose neben den sonst üblichen Methoden, da man eingesehen hat, dass ohne Anwendung specifischer Präparate eine endgiltige Heilung der Tuberkulose schwieriger, langsamer und weniger sicher zu erreichen ist, als mit Anwendung derselben.

These 2.—Die Mehrzahl der mit Tuberkulin arbeitenden Aerzte ist darüber einig, dass die Formen der noch geschlossenen Tuberkulose fast ausnahmslos durch specifische Behandlung geheilt werden können, während die Formen der offenen Tuberkulose nur solange, als sie fieberlos und frei von Mischinfektion sind, durch Tuberkulin günstig beeinflusst und zum Teil geheilt werden können. Es ist daher anzustreben, die Tuberkulose so früh als möglich unter Mithilfe des Tuberkulins zu diagnostizieren und specifisch zu behandeln, ehe grössere Gewebszerstörungen vorhanden sind.

II. Indikation und Kontraindikation.—*These* 3.—Am geeignetsten für die specifische Behandlung ist die von mir bereits 1897* als Primärstadium der tuberkulösen Infektion bezeichnete Lymphdrüsentuberkulose. Falls bereits nekrotische Herde im Innern der stark geschwollenen Drüsen vorhanden sind, so ist erst nach chirurgischer Entfernung der grösseren Drüsen die Behandlung mit Tuberkulin einzuleiten. Der chirurgische Eingriff allein kann stets nur einen Teil der vorhandenen tuberkulösen Krankheitsherde entfernen.

Auch das Sekundärstadium der Tuberkulose, welches die beginnende

* Petruschky: Die Behandlung der Tuberkulose nach Koch, Kongress Moskow, 1897, und Deutsche medicinische Wochenschrift, 1898. Vorträge zur Tuberkulosebekämpfung, No. 1, Leipzig, 1900, Leinewebers Verlag.

Metastasenbildung in Lungen, Haut, Knochen, Pleura, Peritoneum, Nieren, Augen und anderen Organen umfasst, ist für die specifische Behandlung geeignet. Ausgenommen sind nur die akuten, von vorneherein mit Fieber verbundenen Formen der Miliartuberkulose, sowie die Meningitis cerebrospinalis tuberculosa.

Weniger geeignet, aber auch noch oft einer günstigen Beeinflussung durch specifische Behandlung zugänglich ist das Tertiärstadium der Tuberkulose, die offene Tuberkulose, welche die mit Gewebszerstörung verbundenen Ulcerationsprocesse der Tuberkulose der Lungen, des Kehlkopfes, der Nieren, der Knochen, der Haut umfasst. Ungeeignet für die specifische Behandlung sind alle mit deutlichem Fieber und mit Kräfteverfall verbundenen Formen der offenen Tuberkulose.

These 4.—Da die specifische Behandlung eine erhöhte Widerstandsfähigkeit des Körpers gegen das Tuberkulosegift erstrebt, also einer aktiven Immunisierung, einer specifischen Abhärtung entspricht, so muss der Körper selbst die wesentlichste Arbeit bei dieser Behandlung leisten. Voraussetzung für die specifische Behandlung ist daher ein gewisser Kräftevorrat, den ein entkräfteter Patient oft erst durch Sanatorienkur gewinnen muss.* Wo ein hinreichender Kräftevorrat noch vorhanden ist, kann die specifische Behandlung ohne Vorkur, sogar ambulatorisch und ohne Unterbrechung der Berufstätigkeit durchgeführt werden. Dies geschieht bereits bei zahlreichen Arbeitern auf Veranlassung der Landesversicherungsanstalten, Westpreussen, Ostpreussen und Pommern. Die Behandlung findet in der Regel einmal wöchentlich, am Sonnabend statt, weil der darauf folgende Sonntag Ruhetag ist.

III. Art und Wirkung der specifischen Präparate.—*These* 5.—Die specifischen Präparate sind durchweg aus Reinkulturen des Tuberkelbazillus bereitet und lassen sich in zwei grosse Gruppen einteilen: die erste enthält nur die leicht löslichen Stoffwechselprodukte des Tuberkelbazillus, welche direkt aus den Bouillonkulturen oder durch wässerige Extraktion der Bazillen (S. v. Ruck) gewonnen, durch Filtration von den Bazillen befreit (Alttuberkulin Koch) oder uneingedämpft (TO) verwendet werden.

Die zweite Gruppe umfasst die in der Leibessubstanz der Tuberkelbazillen enthaltenen, durch Zerreiben oder Zermahlen der trockenen Bazillen gewonnenen sogenannten Endotoxine (Neutuberkulin Koch, etc.).

Zur Behandlung der Tuberkulose werden beide Gruppen von Präparaten, zur Diagnose in der Regel nur die leicht löslichen Toxine (erste Gruppe) verwendet. Ausser Kulturen des Typus humanus werden zur Behandlung auch solche des Typus bovinus (namentlich auf Anregung von Karl Spengler) verwendet. Nach meinen Erfahrungen sind für die Behandlung der Tuber-

* Weicker und Petruschky: Heilstätte und Tuberkulinbehandlung in gegenseitiger Ergänzung, Leipzig, 1902, Leineweber.

kulose menschlichen Ursprunges die bovinen Präparate nur anfangs zweckmässig, weil ihre Reizwirkung gering ist, später ist die Behandlung möglichst specifisch, d. h. mit Präparaten humanen Ursprunges, womöglich aus Kulturen des betreffenden inficierenden Bazillus (Krause) hergestellt, durchzuführen.

These 6.—Es lassen sich bis jetzt folgende Wirkungen der specifischen Präparate auf den Körper eines Tuberkulösen feststellen.

A. Schwellung, Rötung, Wärme und Schmerz an der Stelle der subkutanen Einspritzung oder der Stelle der kutanen Einimpfung (v. Pirquet) des Tuberkulins.

B. Steigerung der Körpertemperatur sechs bis 36 Stunden nach der Einspritzung für wenige Stunden oder ein bis zwei Tage je nach der Stärke der Dosis.

C. Aktive Hyperämie sämtlicher Regiones infectionis für mehrere Tage.

D. Vorübergehende Störung des Wohlbefindens des Patienten durch Kopfschmerz, Schwächegefühl, Müdigkeit.

E. Aenderung in der Beschaffenheit des Blutes, deren Studium noch nicht abgeschlossen ist. Sicher festgestellt ist bis jetzt eine Vermehrung der mehrkernigen Leukocyten nach vorübergehender Verminderung (Arneth), vermehrte Aktivität der Phagocyten (Wright), Vorkommen von Agglutinin für T. B. im Serum der Behandelten (Koch). Die unter A und B genannten Wirkungen kommen namentlich für die diagnostische Anwendung der Tuberkulinpräparate in Betracht, da sie bei gesunden Personen nicht beobachtet werden.

Die unter C und E genannten Wirkungen sind für die therapeutische Wirkung wesentlich. Schon die Hyperämie aller tuberkulös erkrankten Stellen im Körper, auch der dem Arzte verborgenen (latenten) Herde ist eine therapeutisch sehr wichtige Wirkung, namentlich im Hinblick auf die durch künstliche Hyperämie an zugänglichen Körperstellen erzielten Heilwirkungen (Bier). Die therapeutische Dosierung ist so einzurichten, dass die Reizerscheinungen möglichst gering sind bei allmähliger Steigerung der Dosis. Das Körpergewicht darf nicht dauernd sinken, der Blutbefund soll sich bessern. Die Krankheitserscheinungen sollen nach vorübergehender Steigerung langsam zurückgehen, die Aufeinanderfolge der einzelnen Tuberkulindosen soll nicht zu rasch sein. Ich verabfolge nur ein bis zwei Dosen pro Woche.

IV. Gestaltung des Kurplanes.—*These* 7.—Nach meinen Erfahrungen gelingt es in der Regel nicht durch eine einmalige Tuberkulinkur, auch wenn sie sehr lang ausgedehnt wird, endgiltige Heilung zu erzielen. Zuweilen machen sich bei einer über viele Monate und bis zu sehr grossen Dosen fortgesetzten Tuberkulinbehandlung sogar unangenehme Erscheinungen bemerkbar, wie Anämie, andauernde Gewichtsabnahme, Schlaffheit, etc.,

welche vielleicht auf eine chronische Intoxication oder auf Ueberempfindlichkeit (Anaphylaxie) zurückzuführen sind. Ich bevorzuge daher kürzere, aber nach Intervallen von zwei bis vier Monaten wiederholte Kuren (System der Etappen) und habe die Erfahrung gemacht, dass gerade in der Zwischenzeit, in welcher dem Körper Ruhe zur Verarbeitung des erhaltenen therapeutischen Impulses gewährt ist, die Besserung meist am deutlichsten zu bemerken ist.

V. Kontrolle der Heilung.—*These* 8.—Die Feststellung der Heilung nach tuberkulöser Erkrankung gehört zu den schwierigsten Aufgaben des Arztes. Ebenso wie ein Arzt aus dem negativen Befunde der sogenannten physikalischen Untersuchung niemals das Nichtvorhandensein tuberkulöser Erkrankung schliessen sollte, ebensowenig darf aus dem negativen Befunde allein die Heilung geschlossen werden. Beginnende Tuberkulose ist nicht identisch mit beginnender Lungentuberkulose und Tuberkulose-Reste sind nicht identisch mit Resten einer bestimmten Lokalisation. Nach Beseitigung eines Krankheitsherdes, z. B. einer chirurgisch beseitigten Metastase, sind sehr oft, ja in der Regel, noch centrale Tuberkuloseherde im Lymphdrüsensystem vorhanden. Das Vorhandensein solcher latenter Herde ist durch die specifische Diagnostik fast immer leicht festzustellen; es ist also leichter festzustellen, dass ein Kranker noch nicht geheilt ist als dass er geheilt ist.

Die specifische Behandlung sollte nicht früher als vollständig beendet angesehen werden, als bis auch die Prüfung mit specifischen Mitteln vollständig negativ ausgefallen ist. Zur Nachprüfung eines bereits mit Tuberkulin Behandelten sind für die Injektion in der Regel grössere Dosen zu verwenden als zur ersten Prüfung eines Verdächtigen. Die Kutanreaktion (v. Pirquet) fällt auch bei scheinbar schon völlig Gesunden oft noch kräftig positiv aus; ob sie auch bei wirklich Geheilten zuweilen noch positiv ist, bedarf weiterer Prüfung und anatomischer Kontrolle.

Eine jahrelange Beobachtung der anscheinend geheilten Fälle, womöglich bis zum Lebensende, ist die sicherste Kontrolle der Heilung. Rezidive habe ich bei nicht ganz Geheilten noch bis zu sieben Jahren nach erreichter Symptomlosigkeit beobachtet.

System der Tuberkulosebekämpfung mit Hilfe der specifischen Präparate.

These 9.—Eine Ausrottung der Tuberkulose ist meines Erachtens mit Hilfe der specifischen Mittel in einigen Jahrzehnten zu erreichen, wenn man folgendes System der Bekämpfung zielbewusst durchführt:

A. Absonderung der an offener Tuberkulose Leidenden in Krankenhäusern, Heimstätten oder geeigneten Wohnungen von den anderen Familienmitgliedern soweit als möglich.

B. Prüfung aller der Ansteckung ausgesetzt gewesenen Personen mit specifischen Mitteln (Kutanreaktion), zur Auffindung der latent Erkrankten.

C. Regelmässige Beobachtung und rechtzeitige Behandlung der latent Erkrankten unter Anwendung aller wirksamen Mittel, namentlich der specifischen Präparate. Beseitigung der bereits im Kindesalter erworbenen Infektion womöglich vor Eintritt der Pubertät.

D. Weitere systematische Beobachtung der Behandelten durch ärztliche Untersuchung und Nachprüfung mit specifischen Mitteln. Heirat ist zu gestatten, wenn die Untersuchung und Nachprüfungen ein Jahr hindurch negativ ausgefallen sind.*

E. Beobachtung und specifische Prüfung der Nachkommenschaft an Tuberkulose Erkrankter oder Verstorbener bis ins dritte oder vierte Glied.

Postulata.

These 10.—Für die gründliche Ausbildung einer hinreichenden Anzahl von Aerzten in der Handhabung der specifischen Diagnostik und Therapie der Tuberkulose als besonderer Berufstätigkeit ist in allen Kulturländern Sorge zu tragen. Die gelegentliche Anwendung specifischer Präparate durch nicht besonders vorgebildete praktische Aerzte hat sich in der Regel nicht bewährt.

These 11.—Nicht nur besondere Tuberkuloseabteilungen grösserer Krankenhäuser, sondern namentlich besondere Tuberkulosepolykliniken müssen auch den unbemittelten, noch nicht bettlägerigen Kranken die Möglichkeit der rechtzeitigen und regelrechten specifischen Diagnostik gewähren.†

Sie müssen zur Durchführung der systematischen Tuberkulosebekämpfung mit allen anderen beteiligten Faktoren Hand in Hand arbeiten. Schiffssanatorien sind neben den Landsanatorien vielleicht mehr als bisher zur Tuberkulosebehandlung mit heranzuziehen.

These 12.—Die Belehrung des Volkes über Art, Ziel und Nutzen der specifischen Diagnose und Therapie der Tuberkulose und über ihre Unschädlichkeit bei korrekter Anwendung ist durch die zuständigen Behörden durch Schriften und Vorträge zu veranlassen. Die bisher vorhandenen Merkblätter sind nach dieser Richtung durchaus unzureichend.

Use of Tuberculin.—(Petruschky.)

Dr. Koch's tuberculin and similar preparations are sterile metabolic products of the tubercle bacillus. They serve three important purposes:

1. For early diagnosis of latent tuberculosis.
2. For specific treatment of the first stages of the disease.
3. To control the recovery.

* Petruschky: Beobachtungen über Ehen und Nachkommenschaft specifisch behandelter Tuberkulöser.

† Cf. Petruschky: "Kochs Tuberkulin und seine Anwendung beim Menschen," Berliner Klinik, 1904, Heft 188, Verlag Fischer, Kornfeld

In Germany tuberculin as a means of diagnosis and treatment has been adopted by the great majority of tuberculosis specialists. The cutaneous test (Pirquet's) affords a welcome simplification of the specific diagnosis. We should try most systematically to diagnose and treat tuberculosis with the aid of tuberculin while it is still closed and produces no infectious excretions. All attempts to segregate and to treat patients already infectious are too late.

All attempts at prophylaxis without employment of the specific remedy are like the use of a fire-engine without hose.

L'Emploi de la tuberculine.—(PETRUSCHKY.)

La tuberculine du docteur Koch et les préparations similaires sont des produits métaboliques stériles, du bacille de la tuberculose.

Ils servent trois buts très importants:

1. Pour le diagnostic précoce de la tuberculose latente.
2. Pour le traitement spécifique du premier degré de la maladie.
3. Pour controler la guérison.

La tuberculine a été adoptée en Allemagne par la plupart des spécialistes de la tuberculose pour déterminer le diagnostic et dans le traitement. La réaction cutanée (Pirquet's) offre un heureuse simplification du diagnostic spécifique. Nous devrions essayer systématiquement d'établir le diagnostic et de traiter la tuberculose au moyen de la tuberculine pendant qu'elle est encore fermée et qu'elle ne produit pas de sécrétions infectieuses. Tous les essais tentés pour isoler et traiter les malades déjà infectés, viennent trop tard.

Tous les essais de prophylaxie faits sans l'emploi d'un remède spécifique sont semblables à l'emploi d'une pompe à incende sans tuyau.

ANTIBACTERIAL OR ANTITOXIC IMMUNIZATION IN TUBERCULIN TREATMENT.

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Owing to the limitations of our knowledge as to the effect of tuberculin on the tuberculous organism, and to a most indefinite conception of its action, the best method to be followed in its therapeutic application still remains unsettled, and to a great degree empirical. Leaving aside the minor debatable details of the treatment, two most important features in its application still remain unsettled, namely: the part played by moderate reactions and the place held in our conception of the treatment by tuberculin immunization. Are moderate reactions beneficial or always injurious? and is the highest limit of tolerance attainable through steady progression in dosage the object to be held in view in applying the treatment? These questions cannot be definitely settled until we have a clearer conception of just what we are trying to accomplish by tuberculin injections than we have at present.

Two very widely differing conceptions of what tuberculin treatment accomplishes may be said to prevail at present. These may be summed up as the *vaccination theory*, which claims, through the stimulation of all the various defensive resources of the organism, to bring about, as a result of the injections, a greater or less degree of specific immunity to the action of the tubercle bacillus itself; and the *toxin immunization theory*, which holds that toxin tolerance or immunization to the chemical poison of the tubercle bacillus alone can result from the treatment; that progression in dosage, in order to increase the toxin tolerance to the highest point attainable, is essential, and the aim ever to be kept in view in applying the treatment; that the local disease is influenced but secondarily, as by any measure that increases the general resistance of the patient, and that the healing of the tuberculous process takes place under treatment, when this is possible, only by the natural physiological defensive resources of the organism, and not by any specific immunity acquired through the medium of the injections.

Under the first conception, that of specific immunization to the bacillus, are Koch's later attempts at producing an immunizing tuberculin, the work of Wright and his vaccine treatment, according to the readings of the opsonic index, and that of many other investigators, who have held to the con-

ception of a specific immunization to the bacillus, and tried to develop a method that would bring about a more or less solid immunity to the disease, analogous to that produced by other vaccines in other infections.

Sahli, Denys, and others, on the other hand, hold solely to the conception of a purely self-produced *antitoxic immunity*, and in their proposed plan of injections they adopt a gradual progression in dosage, and ever hold in view the aim of producing the highest degree of tuberculin tolerance or immunity attainable in each case.

Now it is evident that the method of administration,—that is, the best dose to begin with,—the necessity and ratio of its increase, and the intervals between doses, as well as the length of the treatment, must depend greatly upon our conception of just what tuberculin can and does accomplish. The place held in the treatment by general and focal reactions, for instance, still remains undetermined, and it is evidently of the utmost importance that we should have a clear conception of the part they play before we can decide whether they are beneficial or injurious. They hold no place in Professor Wright's method, which aims only to gage the specific immunization of the opsonic index, and which looks upon fever reactions as evidences of a negative phase.

In the toxin immunization conception of the treatment, also, general and even focal reactions play no part, and are looked upon merely as evidences of intolerance and of overdosing. They are to be avoided as much as possible, because they produce no specific immunization to the tubercle bacillus, and because, though when moderate they are generally well tolerated and apparently harmless, if at all severe they are apt to exhaust and arrest the production of antitoxic substances, to influence the patient's general condition unfavorably, and to aggravate and activate the diseased focus by the violence of the inflammatory changes they bring about in it.

On the other hand, in the conception that aims at the production of specific immunity, general and focal reactions hold a more or less distinct place, the fever and the focal reaction being looked upon as a part of the mechanism of immunization, by which a certain degree of specific resistance is brought about, as well as reparative changes in the local process.

Clinical experience has quite definitely established by this time that marked reactions, whether general or focal, are not beneficial, and may be dangerous by their baneful effect on the general condition of the patient, and also by producing aggravation and extension of the local lesion.

It is to a great extent owing to the very evident ill effects of treatment by strong reactions that tuberculin fell into such general and deserved disrepute. The value of mild general or focal reactions, however, still remains a debatable question, and their usefulness has many advocates. Any conclusion as to their beneficial influence must rest principally on extended clinical

observations, and the study of the records of cases in which they occur, as compared with those in which, owing to the tolerance of the patient or the care with which the dosage is regulated, no reactions take place throughout the treatment. Clinically, it has been well demonstrated, however, that as good results may be obtained in cases where no general or appreciable focal reactions occur during the entire course of injections, as in those in which they do. Animal experiments offer no proof as to the immunizing value of fever reactions produced with tuberculin, for when healthy animals are treated, no specific immunity to the tubercle bacillus results, whether or not the doses are large enough to produce fever. On the other hand, if there is little or no evidence forthcoming that the general fever reactions are in themselves beneficial, clinical observations tend to show that mild reactions are harmless, and are often followed by a certain degree of general improvement, and there is some evidence, where it is possible to observe the tuberculous process, that moderate focal reactions produce improvement in the local process. In lupus, in laryngeal tuberculosis, and in eye tuberculosis in man, as well as in artificially produced eye tuberculosis in rabbits, a very apparent local improvement in the lesion follows moderate focal reactions caused by the injections. Besides, slight focal reactions, inappreciable clinically, are no doubt taking place constantly as the result of the injections, and it is only when they are marked enough to cause symptoms that we realize that the minute doses of tuberculin injected have any direct influence on the local lesion. Improvement in the lesion may depend on the influence of these mild reactions, but in considering the advisability of utilizing mild general and focal reactions as a feature of the treatment, we must not forget that we have no means of controlling the severity of these reactions, and that violent focal reactions are not without danger.

In the second conception, that of toxin immunization only, general reactions play no part, and progression in dosage is necessarily the essential feature. In aiming to establish tuberculin tolerance we are brought face to face with the as yet little understood phenomena of hypersensitiveness and anaphylaxis, and our lack of exact knowledge as to the part played by hypersusceptibility in tuberculous infection is a serious stumbling-block in our attempts to form a conception of what it is advisable to aim to accomplish by our treatment. We do not even know whether the usual sensitiveness to tuberculin in the infected organism—a sensitiveness that, in most cases, can be overcome to a marked degree by the injections—is one of the defensive resources of the organism, and represents an effort on the part of nature to protect it against an advancing infection, or whether it is the first step in an attempt at the production of a toxin immunization that is never realized. The cure of the tuberculous progress by the natural physiological resources of the infected organism is certainly not dependent on a general toxin im-

munization, and, indeed, hypersusceptibility is an accompaniment of latent tuberculosis, and may persist for some time after the tuberculous process has disappeared. Experimentally, as in serum anaphylaxis, and clinically also, however, we know that progression in dosage is essential to toxin immunization instead of toxin hypersusceptibility, the same moderate doses repeated at long intervals tending to bring about hypersusceptibility, and very minute but gradually increased doses at shorter intervals, tolerance. It is true, however, that tuberculin intolerance can also be produced by too frequent and too rapidly increased doses.

The toxin immunization conception is founded on clinical observations that show that tolerance of patients to tuberculin can in most cases be greatly increased by long-continued and careful progression in dosage—in some patients ten, in some a hundred, in some a hundred thousand, and in some a million times—and that gradually increased tolerance in most cases goes hand in hand with improvement in the patient's general condition. It is true that the chronic toxemia we are aiming to efface by stimulating the cells to a production of antibodies is only one of the evil effects produced by the infection, but by its baneful influence on the appetite, the vital functions, and the nutrition, it must tend to weaken the other defensive resources of the organism—leukocytosis, bacteriolysis, phagocytosis, and fibrosis—that are coping locally with the infection; and it cannot be denied that to relieve the patient of his systemic poisoning must have a favorable influence on the course and on the ultimate issue of his disease. This is shown clinically by the improvement in the patient's general condition which this method of treatment produces, and also by the many instances where the improvement seems to be maintained for long periods after the treatment is discontinued, and so long as the toxin immunity persists, and where a return of toxin susceptibility is found to be accompanied by evidences of activity in the local lesion.

It cannot be said, however, that the amount of good a patient derives from tuberculin treatment is always in direct ratio to the size of the dose of toxin he can be brought to tolerate. This evidently depends principally on the natural physiological resources of each infected organism. If these are markedly deficient, no amount of artificially induced toxin tolerance will cure the disease. Tuberculin tolerance, we must remember, does not mean immunity to tuberculosis, either clinically or experimentally, and we should not expect too much from its production. Above all, we should beware of exhausting, by too rapid an increase in dosage, the power of the organism to respond to the increasing stimulation of the toxin, and thus produce in an aggravated form the very toxemia we are aiming to efface.

As we review the claims of these two conceptions as guides to a method of treatment, we are obliged to own that neither is satisfactory, owing to our

as yet imperfect knowledge of the mechanism of tuberculosis infection, and especially of acquired and artificial immunity. The production of a general antibacterial immunity by tuberculin is not supported by experimental evidence, and in holding this conception we have nothing to guide us clinically in our attempts to induce it, for the fluctuations of the opsonic index as a guide to dosage in the treatment of pulmonary tuberculosis have been found unreliable and impracticable. On the other hand, I cannot accept a purely antitoxic immunization as explaining all the good effects of tuberculin treatment, for in cases of purely localized disease, as in the skin or the eye, or even where the infection is confined to the lymph-nodes, and where the general health is unimpaired and no evidence of chronic toxemia exists, it is impossible to deny the favorable influence the injections exert on these localized lesions. This may be due, however, to the many imperceptible focal reactions brought about by the injections, and not to any general specific immunity.

If we must have a working theory and must decide between the two, I prefer, for the present, to hold to the conception of an immunity that is, principally at least, antitoxic, as produced by the treatment, and to consider tuberculin habitation its essential feature and the best guide to dosage. This conception does not lead us to expect too much, is more in keeping with what we observe clinically as a result of treatment, and explains its very evident limitations. It is also in accord with experimental evidence, which shows that vaccinations with living cultures alone produce any real immunity to subsequent tuberculous infection, and that no specific antibacterial immunity worthy of the name can be brought about in animals by dead germs or chemical products derived from cultures.

If we accept the toxin immunization conception as the essential feature and guide to the treatment, instead of measuring the degree of a questionable antibacterial immunity by the opsonic index, or attempting to produce it more or less empirically by a series of moderate reactions, the severity of which we cannot in any way control, the main features in our treatment would be:

To raise the degree of tolerance of tuberculin to the highest point attainable in each case by an almost imperceptible and long-continued progression in dosage.

To avoid general and local reactions as much as possible, and consider them merely as evidences of intolerance.

To follow no arbitrary rule as to rate of increase or the maximum dose to be reached, but to be guided merely by the degree of toxin tolerance of each patient, as shown by the symptoms and general condition, whether the highest individual maximum dose attainable be only a small fraction of a milligram or a cubic centimeter or more.

L'Immunisation antibactérielle ou antitoxique dans le Traitement de la Tuberculose.—(TRUDEAU.)

Il nous faut une idée nette de ce que nous espérons accomplir au moyen du traitement avec la tuberculine, pour nous guider dans nos méthodes de traitement en général. Deux théories principales: Théorie de la vaccination, qui prétend effectuer á l'aide d'injections une immunité spécifique contre le bacille de la tuberculose; et la théorie de l'immunisation par la toxine, qui prétend seulement produire, en augmentant graduellement et constamment les doses, le plus grand degré de tolérance ou d'immunisation contre le poison chimique du bacille tuberculeux. La première conception—l'immunité spécifique contre le bacille—renferme les tentatives plus récentes de Koch pour produire une tuberculine immunisante, les réactions tant locale que focale y étant considerées comme utiles dans la production de l'immunité spécifique contre le bacille. Elle renferme de même le travail de Wright et son traitement avec la vaccine contrôlé par l'index opsonique. Selon la théorie de l'immunisation par la toxine, dont Denys et Sahli sont les adhérents les plus illustres, il s'agit surtout de produire à l'aide d'augmentations graduelles des doses de plus haut degré de tolérance pour le poison du bacille de la tuberculose qui puisse s'obtenir; les réactions et les troubles généraux, selon cette théorie, loin d'être desirés, doivent être évités autant que possible. L'ateur discute les prétentions de ces deux théories et conclue qu'elles ne sont ni l'une ni l'autre satisfaisantes parce que nous ne comprenons guère le mécanisme l'immunisation par la tuberculine. Il nous faut une théorie provisoire et par conséquent il faut choisir entre les deux. Pour le moment l'auteur préfère s'attacher à l'idée d'une immunité qui est, au moins pour la plupart, antitoxique, produite par le traitement, et considère comme son trait principal l'accountumance à la tuberculine, qut est aussi le meilleur guide pour le dosage.

Si nous acceptons l'immunisation par la toxine comme caractère essentiel du traitement et comme guide pour le dosage, au lieu de mesurer le degré d'une immunité antibactérielle, qui peut-être n'existe pas, au moyen de l'index opsonique, ou d'essayer de la produire d'une manière plus ou moins empirique à l'aide de certaines réactions, dont nous ne pouvons nullement régler, la sévérité les caractères principaux de notre traitement seront:

Augmenter la tolérance pour la tuberculine au plus haut degré, possible dans chaque cas par une progression quasi imperceptible et prolongée dans la dosage.

Eviter autant que possible les réactions générales et focales et les envisager tout simplement comme signes d'intolérance.

Ne pas observer de règle arbitraire en ce qui concerne la mesure des augmentations ou la dose maximale à atteindre, mais plutôt prendre pour guide le degré de tolérance pour la toxine de chaque malade, se montrant

dans les symptômes et dans l'état général, n'importe que la plus grande dose individuelle à laquelle on puisse arriver soit seulement une petite fraction d'un milligramme ou en excès d'un centimètre cube.

Antibakterielle oder antitoxische Immunisierung in der Behandlung der Tuberkulose.—(TRUDEAU.)

Eine klarere Auffassung dessen, was wir versuchen, um die Behandlung der Tuberkulose vollendet zu gestalten, ist sehr nötig, um uns bei den Behandlungsmethoden zu leiten. Zwei Haupttheorien, die Impfungstheorie, welche behauptet, durch Injektionen eine specifische Immunität gegen den Tuberkelbazillus hervorzubringen, und die Toxin-Immunisierungstheorie, welche sich auf den Standpunkt stellt, hauptsächlich durch stetiges und gradweises Fortschreiten in der Dosierung den höchsten Grad von Toleranz oder Immunisierung dem Gifte des Tuberkelbazillus gegenüber zu erreichen. Unter der ersten Auffassung der specifischen Immunisierung gegen den Bazillus sind Koch's Versuche, ein immunisierendes Tuberkulin für lokale und lokale Reaktionen zu schaffen, die als sehr nützlich angesehen werden, in der Hervorrufung der Immunisierung gegen den Bazillus; auch die Forschungen von Wright und seine Impfungsbehandlung, beeinflusst durch das Ablesen des Opsonic-Index. Unter den Immunisierungstheorien, unter welchen Denys und Sahli die interessantesten Experimente gemacht haben, ist das Hauptziel der Behandlung, durch ansteigende Dosierung den höchsten Grad von Toleranz gegen das Gift des Tuberkelbazillus hervorzurufen, erreicht, wenn man die Reaktion in Erwägung zieht und auch, dass alle konstitutionellen Störungen nicht nur nicht hinweggeleugnet werden können, sondern auch soviel als möglich zu vermeiden sind. Diskussion über beide Auffassungen; der Autor kommt zur Schlussfolgerung, dass unsere ungenügende Kenntnis des Mechanismus der Tuberkulin-Immunisierung schuld daran ist, noch keine besonders günstigen Resultate erzielt zu haben. Wenn wir eine arbeitende Theorie haben und zwischen den beiden entscheiden müssen, zieht es der Autor gegenwärtig vor, die Auffassung einer Immunität festzuhalten, das ist, prinzipal zuletzt antitoxisch, wie hervorgerufen durch die Behandlung und die Gewöhnung an Tuberkulin als hauptsächlichste Massnahme und die beste Regelung der Dosierung anzusehen. Wenn wir die Auffassung der Toxin-Immunisierung als die Hauptmassnahme der Behandlung und Dosierung annehmen, anstatt den Grad einer fraglichen antibakteriellen Immunität des Opsonic-Index oder es anstreben, dies mehr oder weniger empirisch durch eine Serie von Reaktionen zu erreichen, wobei wir uns darüber klar sein müssen, dass Schwierigkeiten entstehen könnten, die wir in der Behandlung nicht voraussehen können.

Um den Grad der Toleranz gegenüber Tuberkulin auf den höchsten Grad

zu bringen, der erreichbar ist, muss man in jedem Falle die Empfänglichkeit in Betracht ziehen, und das Ansteigen der Dosierung anstreben.

Um allgemeine und lokale Reaktionen so früh als möglich zu vermeiden, und sie hauptsächlich als Offenbarungen der Intoleranz anzusehen.

Keiner anderen Regel folgen als die Rate der ansteigenden oder Maximum-Dosis zu erreichen, aber sich mehr durch den Grad der Toxintoleranz leiten zu lassen, wie sie sich durch die Symptome und das Allgemeinbefinden äussert, ob die höchste Maximum-Dosis die vertragen werden kann, nur durch einen kleinen Bruchteil eines Milligramms oder einen Kubikzentimeter oder mehr erreicht werden kann.

DISCUSSION.

Dr. Pottenger (Monrovia, California) remarked that he had been using vaccines made from both the human and bovine type of bacillus for the past three years. He agrees with Dr. Raw in his contention concerning the difference in action of the vaccines made from the two types of bacilli. This difference is shown in the time of the reaction following the injection, that due to the bovine vaccine usually appearing later than that due to the human. He has also noted that when one vaccine seems to increase the signs of toxicity, as noted by a feeling of nervousness, malaise, slight rise of temperature, the vaccine from the other type will usually relieve these. If sufficiently large doses be given, both vaccines will produce reaction, but the patient usually shows an unequal degree of tolerance for the two. The preparations which he had used for the most part were P. V. and TB. V. (Spengler), preparations containing both the soluble and insoluble toxins of the bacilli.

He had observed the local reaction mentioned by Dr. Detre, and had noted that, as a rule, a patient showing a local reaction to the vaccine from one type would not show a reaction to the vaccine from the other type. He had noticed, however, that infection of the lungs will sometimes respond therapeutically to one, and not to the other. As a rule, acute pulmonary conditions are best relieved by preparations from the bovine type of bacillus, and the chronic forms do better on the human type. To this, however, there are exceptions. Therapeutically the vaccine should be used which proves the least toxic. The theory of the action of the preparations from the different types of bacillus is analogous to the vaccination against smallpox and cow-pox. Cow-pox successfully vaccinates against smallpox, and it is said on good authority that it is possible to vaccinate with smallpox against cow-pox. The explanation of the better action of the less toxic preparations may be that while it was not the same toxin, and consequently did not increase toxicity, yet it is sufficiently near to the toxin which causes the symptoms to stimulate the cells to the production of immunizing bodies.

He narrated the case of a young woman suffering from pulmonary tuberculosis and also enlarged cervical glands. Under bovine vaccine the cough and sputum lessened rapidly, and her general condition became better; however, the glands in the neck became inflamed and painful. On changing to human vaccine, the glands disappeared, but returned upon resuming the bovine vaccine. This was, according to our supposition, evidently a case of double infection.

Dr. Pottenger is of the opinion that the tubercle bacillus itself can produce a temperature of 101° to 102° F., and consequently we must modify our opinion of mixed infection. Such a temperature can be reduced at times by the administration of the proper vaccine in a few days or a few weeks.

Dr. E. H. Sauvignet: As in many sputum examinations streptococci and staphylococci are present, do the lecturers believe that antistreptococcic and antistaphylococcic serum should be used in conjunction with the appropriate tuberculins?

Dr. R. W. Philip (Edinburgh): Ever since the first announcement of Koch's tuberculin, I have persistently made use of tuberculin in one or other form. I am glad to have the opportunity of stating emphatically that, while I have used it in a great number of cases, I have not seen important harm follow in a single instance. Contrariwise, in the overwhelming majority of instances it has proved itself a therapeutic agent of first importance. Tuberculin must be used with the reasonable precautions properly taken in relation to other potent remedies.

Tuberculin has a wide application in medicine and surgery. But it must be remembered that it has its limitations. These limitations are twofold: (1) anatomical, (2) physiological. In respect of the former, the question is really, To what extent is cicatricial shrinkage possible in the given case? In the great majority of strictly local lesions such shrinkage is readily effected, whether in lung, larynx, pleura, peritoneum, or genito-urinary tract. It is remarkable what satisfactory results are obtainable in such cases. It is another matter, in the case of the lung, when destruction and excavation of tissue have gone much further. Then the real difficulty of cure is chiefly anatomical. The firm thoracic wall refuses to yield beyond a certain point. The necessary cicatrization is impossible without operative interference, and that, we all know, is not well borne.

The physiological limit is determined by the extent of systemic intoxication. In proportion as the process has ceased to be a localized lesion and become a constitutional affection, the use of tuberculin becomes undesirable, and may prove seriously harmful.

Dr. Béraneck said, in answer to the question of Dr. Sauvignet, that he had no experience with the effect of antistreptococcus or antistaphylococcus

serum administered simultaneously with tuberculin. He does not believe that these infections have any material effect on the progress of the disease. He believes that the fever of tuberculosis is due almost solely to the effects of the tubercle bacillus, and that therefore tuberculin is alone indicated.

Dr. Denys, in answer to the question of Dr. Sauvignet, remarked that in his opinion the secondary infections from these organisms (streptococci and staphylococci) play but a small rôle in pulmonary disease, and that their influence has been much exaggerated. He bases this conclusion upon experiments directed toward the elucidation of this very question. One would expect that, if the streptococcus represented a great factor in the progress of the disease, one ought to get improvement by immunizing the patient with an antistreptococcus serum. He has not used a serum; but he has treated 100 patients with the cultures of killed streptococci, in doses sufficiently high to be certain of their immunizing action. Most of these cases were such as were in a stationary period, under tuberculin treatment, in whom marked symptoms were still present, and who were not improving. Under such circumstances he has failed to find any amelioration as the result of inoculation with the streptococcus cultures. He has done the same thing with cultures of staphylococci and pneumococci, in no instance with evident benefit. He has not used sera for the reasons that these might be accompanied by their well-known unfavorable effects, in the way of eruptions, arthropathies, etc. One further consideration: Streptococcus infections lead either to death or recovery within a short time. Their course is rapid. This characteristic is remarkable by its absence in the ordinary pulmonary tuberculous infections. He believes, however, that many patients go through a phase of streptococcus infection or toxemia ending with recovery without giving clear evidence symptomatically; and that these probably receive thereby some degree of streptococcus immunity.

Dr. E. L. Trudeau: I have used for many years a tuberculin which is simply the filtrate of liquid cultures of tubercle bacilli, as advocated by Dr. Denys, first experimentally as early as 1892 in treating tuberculosis in the rabbit's eye, and of recent years in the treatment of pulmonary tuberculosis in patients. I am not a strong advocate of any particular tuberculin, but I prefer those in which no heat or chemical manipulation has been used—that is, the filtrate of liquid cultures or the bacillen emulsion of Koch—to Koch's original tuberculin. Many toxins are injured by heat, and there certainly is in the filtrate of liquid cultures some substance—whether it be inert or active it is impossible to say—but there is a substance which is precipitated by boiling of the filtrate after the bacilli have grown on it, and which is therefore not in Koch's old tuberculin. The filtrate has seemed to me less apt to produce sudden and violent reactions than the bacillen emulsion, which theoretically should be the best tuberculin, but this may be

simply due to coarser particles in the bacillen emulsion which are absorbed more irregularly.

So far as Dr. Denys's method is concerned, I agree entirely with the rules he has laid down, but I prefer a more gradual increase, especially for the first five doses of each new solution. I also think that the size of the dose reached finally is of less importance than the length of the treatment, as the susceptibility of each patient varies so greatly. The best final dose never should exceed what the patient bears without disturbance, whether this be only a fraction of a milligram or a cubic centimeter or more. When I first began to use tuberculin, the good to the patient was supposed to be in relation to the size of the dose he was made to tolerate, and in this way I think harm was often done by attempting to reach the full dose at all hazards. I have also learned, I think, that in cases where intolerance is marked, doses as small as 0.0001 or 0.001 milligram are quite efficient to begin with, and are followed by improvement, and that the extending of the treatment over as much time as is necessary to overcome intolerance as much as possible and avoid reactions is a most essential feature of its successful application.

Dr. Raw's paper is most interesting, but I cannot agree with his view that bovine tuberculin is necessarily more efficacious in the treatment of human tuberculosis as it occurs in the pulmonary type of the disease, and conversely that supposed bovine lesions in the human subject are more amenable to treatment by tuberculin derived from human cultures of the bacillus. The tuberculin which after all these years of contention has finally won a certain place in the specific treatment of pulmonary and other types of tuberculosis in human beings has practically all been made from human cultures.

We must remember that we are dealing with a toxin and not with a living vaccine. The best immunity produced is through a living germ, and the first condition of a vaccine is to get a germ that will not kill the animal to be protected. Whether this be done by passage through an animal of another species or by prolonged cultivation seems of little importance. Experimentally I have failed to protect rabbits against subsequent bovine infection by preventive inoculations of attenuated human cultures. On the other hand, human cultures attenuated by prolonged cultivation have been found by de Schweinitz and myself to afford marked protection to guinea-pigs against subsequent virulent infection by human tubercle bacilli, so that the type of germ used as a vaccine does not seem to be the essential feature of success, but merely that the germ be living and be of diminished virulence for the animal to be protected.

SECTION II.

Clinical Study and Therapy of Tuberculosis. Sanatoriums, Hospitals, and Dispensaries (*Continued*).

THIRD DAY. AFTERNOON SESSION.

Wednesday, September 30, 1908.

Concluding the Symposium on

SPECIFIC THERAPY OF PULMONARY TUBERCULOSIS.

PART II.—SERUM TREATMENT.

Section II was called to order by the President, Dr. Vincent Y. Bowditch, on Wednesday afternoon, September 30th, at half-past two o'clock.

THE MARAGLIANO SERUM TREATMENT AT THE HENRY PHIPPS INSTITUTE.

By Lawrence F. Flick, M.D.,
Philadelphia.

When the Phipps Institute was organized, it gave a course of lectures as part of its educational work. One of the lectures was by Maragliano, on "Specific Therapy of Tuberculosis and Vaccination Against the Disease." Maragliano did not appear in person, but his lecture was read for him, in the English language, before a large audience, on March 28, 1904, and was published in the First Annual Report of the Institute.

Maragliano made the announcement, as the result of his clinical and experimental work: "First, that it is possible to produce a specific therapy for tuberculosis; second, that it is possible to immunize the animal organism against tuberculosis, as is done in other infectious diseases, and that there is good reason to hope for an antituberculosis vaccination for man."

The Phipps Institute, having introduced Maragliano to an American

audience, felt under obligations to test his claims. Its bacteriologist, Dr. M. P. Ravenel, was sent to Maragliano's laboratory to study his methods. Dr. Ravenel spent six weeks in Genoa, and during this time worked with the men who were doing Maragliano's work. Dr. Leonard Pearson was also sent to Europe to study the methods used by other men in serum work. The official reports of Drs. Ravenel and Pearson were published in the Second Annual Report of the Institute.

While abroad, Dr. Ravenel was authorized to purchase some of Maragliano's serum for the use of the Institute. A detailed account of the use of this serum was also published in the Second Annual Report.

In March, 1905, Dr. Ravenel began to make the serum according to Maragliano's method. Two young healthy cows were purchased and placed in a stable a few blocks away from the Institute. They were tested with tuberculin by Dr. L. H. Gilliland and found free from tuberculosis. Injections were given as follows:*

Red Cow.					Black Cow.				
1905.	Liquid F.	Bacillary Pulp.	Filtered Toxin.	Watery Tuberculin.	1905.	Liquid F.	Bacillary Pulp.	Filtered Toxin.	Watery Tuberculin.
Mar. 17...	5 c.c.	5 c.c.	..	..	..	..	..	..	..
" 21...	5 c.c.	5 c.c.	..	..	..	..	..	..	..
" 24...	5 c.c.	5 c.c.	..	..	..	..	..	..	..
" 28...	5 c.c.	5 c.c.	..	..	..	..	..	..	..
Apr. 1...	10 c.c.	10 c.c.	..	..	Apr. 1..	5 c.c.	5 c.c.	..	..
" 6...	10 c.c.	10 c.c.	..	..	" 6..	5 c.c.	5 c.c.	..	..
" 11...	10 c.c.	10 c.c.	..	..	" 11..	5 c.c.	5 c.c.	..	..
" 15...	12 c.c.	12 c.c.	..	..	" 15..	5 c.c.	5 c.c.	..	..
" 20...	20 c.c.	20 c.c.	..	..	" 20..	20 c.c.	20 c.c.	..	..
" 26...	30 c.c.	30 c.c.	..	..	" 26..	30 c.c.	30 c.c.	..	..
May 2...	30 c.c.	30 c.c.	..	..	May 2..	30 c.c.	30 c.c.	..	..
" 9...	30 c.c.	30 c.c.	..	..	" 9..	30 c.c.	30 c.c.	..	..
" 15...	30 c.c.	30 c.c.	..	..	" 16..	Calved, no injection.			
" 26...	40 c.c.	40 c.c.	..	..	" 26..	40 c.c.	40 c.c.	..	..
June 3...	40 c.c.	40 c.c.	..	..	June 3..	40 c.c.	40 c.c.	..	..
" 8...	50 c.c.	50 c.c.	..	..	" 8..	50 c.c.	50 c.c.	..	..
" 13...	50 c.c.	50 c.c.	..	..	" 13..	50 c.c.	50 c.c.	..	..
" 19...	50 c.c.	50 c.c.	..	..	" 19..	50 c.c.	50 c.c.	..	..
" 22...	Cow calved.								
" 26...	50 c.c.	50 c.c.	..	..	" 26..	50 c.c.	50 c.c.	..	..
July 1...	50 c.c.	50 c.c.	..	..	July 1..	50 c.c.	50 c.c.	..	..
" 19...	Bled cow 1000 c.c.				" 19..	50 c.c.	50 c.c.	..	..
Aug. 3...	50 c.c.	50 c.c.	..	..	Aug. 3..	..	50 c.c.	..	..
" 10...	50 c.c.	50 c.c.	..	..	" 10..	..	50 c.c.	..	..
" 16...	50 c.c.	50 c.c.	..	..	" 16..	..	50 c.c.	..	..
" 25...	50 c.c.	50 c.c.	..	..	" 25..	..	50 c.c.	..	..
Sept. 1...	..	50 c.c.	50 c.c.	..	Sept. 1..	..	50 c.c.	50 c.c.	..
" 8...	..	50 c.c.	25 c.c.	25 c.c.	" 8..	..	50 c.c.	25 c.c.	25 c.c.
" 15...	..	50 c.c.	25 c.c.	25 c.c.	" 15..	..	50 c.c.	25 c.c.	25 c.c.

* These records are taken from the original entry.

Red Cow.					Black Cow.				
1905.	Liquid F.	Bacillary Pulp.	Filtered Toxin.	Watery Tuberculin.	1905.	Liquid F.	Bacillary Pulp.	Filtered Toxin.	Watery Tuberculin.
Sept. 23...	..	50 c.c.	25 c.c.	25 c.c.	Sept. 23..	..	50 c.c.	25 c.c.	25 c.c.
" 29...	..	50 c.c.	25 c.c.	25 c.c.	" 29..	..	50 c.c.	25 c.c.	25 c.c.
Oct. 7...	..	50 c.c.	25 c.c.	25 c.c.	Oct. 7..	..	50 c.c.	25 c.c.	25 c.c.
" 16 ..	..	50 c.c.	25 c.c.	25 c.c.	" 16..	..	50 c.c.	25 c.c.	25 c.c.
" 18 ..	Bled cow 2000 c.c.								
" 23...	..	50 c.c.	25 c.c.	25 c.c.	" 23..	..	50 c.c.	25 c.c.	25 c.c.
" 30...	..	50 c.c.	25 c.c.	25 c.c.	" 28..	..	Bled 2000 c.c.		
					" 30..	..	50 c.c.	25 c.c.	25 c.c.
Nov. 7...	..	50 c.c.	25 c.c.	25 c.c.	Nov. 7..	..	50 c.c.	25 c.c.	25 c.c.
" 16...	..	50 c.c.	25 c.c.	25 c.c.	" 16..	..	50 c.c.	25 c.c.	25 c.c.
" 22...	..	50 c.c.	25 c.c.	25 c.c.	" 22..	..	50 c.c.	25 c.c.	25 c.c.
" 28...	..	Bled cow 2000 c.c.			" 28..	..	Bled cow 100 c.c.		
Dec. 4...	..	50 c.c.	25 c.c.	25 c.c.	Dec. 4..	..	50 c.c.	25 c.c.	25 c.c.
" 12...	..	50 c.c.	25 c.c.	25 c.c.	" 12..	..	Cow sick; did not inject.		
" 22...	..	50 c.c.	25 c.c.	25 c.c.	" 22..	..	50 c.c.	25 c.c.	25 c.c.
" 28...	Bled cow 2000 c.c.			1600 c.c.	" 28..	..	Bled cow 2000 c.c.		
1906.					1906.				
Jan. 7...	..	50 c.c.	25 c.c.	25 c.c.	Jan. 7..	..	50 c.c.	25 c.c.	25 c.c.
" 14...	..	50 c.c.	25 c.c.	25 c.c.	" 14..	..	50 c.c.	25 c.c.	25 c.c.
" 22...	..	50 c.c.	25 c.c.	25 c.c.	" 22..	..	50 c.c.	25 c.c.	25 c.c.
" 28...	..	50 c.c.	25 c.c.	25 c.c.	" 28..	..	50 c.c.	25 c.c.	25 c.c.
Feb. 4...	..	50 c.c.	25 c.c.	25 c.c.	Feb. 4..	..	50 c.c.	25 c.c.	25 c.c.
" 13...	..	50 c.c.	25 c.c.	25 c.c.	" 13..	..	50 c.c.	25 c.c.	25 c.c.
" 18...	..	50 c.c.	25 c.c.	25 c.c.	" 18..	..	50 c.c.	25 c.c.	25 c.c.
" 24...	..	Bled cow 2000 c.c.			" 24..	..	Bled cow 2000 c.c.		
Mar. 10...	..	50 c.c.	25 c.c.	25 c.c.	Mar. 10..	..	50 c.c.	25 c.c.	25 c.c.
" 16...	..	50 c.c.	..	..	" 16..	..	50 c.c.	..	..
" 23...	..	50 c.c.	..	..	" 23..	..	50 c.c.	..	..
" 29...	..	50 c.c.	..	..	" 29..	..	50 c.c.	..	..
Apr. 4...	..	50 c.c.	..	..	Apr. 4..	..	50 c.c.	..	..
" 11...	..	50 c.c.	..	..	" 11..	..	50 c.c.	..	..
" 18...	..	50 c.c.	..	..	" 18..	..	50 c.c.	..	..
" 25...	..	50 c.c.	..	..	" 25..	..	50 c.c.	..	..
May 2...	..	50 c.c.	..	..	May 2..	..	50 c.c.	..	..
" 9...	..	50 c.c.	..	..	" 9..	..	50 c.c.	..	..
" 16...	..	50 c.c.	..	..	" 16..	..	50 c.c.	..	..
" 23...	..	50 c.c.	..	..	" 23..	..	50 c.c.	..	..
" 31...	..	50 c.c.	..	..	" 31..	..	50 c.c.	..	..
July 5...	..	50 c.c.	..	..	July 5..	..	50 c.c.	..	..
" 14...	..	50 c.c.	..	..	" 14..	..	50 c.c.	..	..
" 20...	..	50 c.c.	..	25 c.c.	" 20..	..	50 c.c.	..	25 c.c.
" 25...	..	50 c.c.	..	25 c.c.	" 25..	..	50 c.c.	..	25 c.c.
Aug. 1...	..	50 c.c.	..	25 c.c.	Aug. 1..	..	50 c.c.	..	25 c.c.
" 8...	..	50 c.c.	..	25 c.c.	" 8..	..	50 c.c.	..	25 c.c.
" 15...	..	50 c.c.	..	25 c.c.	" 15..	..	50 c.c.	..	25 c.c.
" 22...	..	50 c.c.	..	25 c.c.	" 22..	..	50 c.c.	..	25 c.c.
" 29...	..	50 c.c.	..	25 c.c.	" 29..	..	50 c.c.	..	25 c.c.
Sept. 8...	..	Bled 2000 c.c.			Sept. 8..	..	Bled 2000 c.c.		
	Agglutinated 1–40.					Agglutinated 1–40.			

There is no record of further injections having been given until January 4, 1907.

In October, 1906, the cows were moved to the State Experimental Farm. They were stabled "in a disinfected stable that is used for young calves, none of which are tubercular, and were allowed to exercise in the yard every day, but never came in contact with tubercular cattle." The record of weights from this time on was as follows:

1906. Red Cow.		1906. Black Cow.	
Oct. 23	870 lbs.	Oct. 23	1025 lbs.
Dec. 26	870 "	Dec. 26	1025 "
1907.		1907.	
Jan. 21	870 lbs.	Jan. 21	1050 lbs.
Feb. 23	875 "	Feb. 23	1030 "
Mar. 22	880 "	Mar. 22	1100 "
Apr. 25	865 "	Apr. 25	1110 "
May 28	675 "	May 28	1085 "
		June 27	1160 " fine condition.

While the cows were in the State Experimental Farm they received each the following injections:

Red Cow.			Black Cow.		
1907.	Bacillary Pulp.	Watery Tuberculin.	1907.	Bacillary Pulp.	Watery Tuberculin.
Jan. 4	50 c.c.	50 c.c.	Jan. 4	50 c.c.	50 c.c.
" 14	50 c.c.	50 c.c.	" 14	50 c.c.	50 c.c.
" 25	50 c.c.	50 c.c.	" 25	50 c.c.	50 c.c.
Feb. 7	50 c.c.	50 c.c.	Feb. 7	50 c.c.	50 c.c.
" 16	50 c.c.	50 c.c.	" 16	50 c.c.	50 c.c.
Mar. 16	50 c.c.	50 c.c.	Mar. 16	50 c.c.	50 c.c.
" 26	50 c.c.	50 c.c.	" 26	50 c.c.	50 c.c.
Apr. 6	50 c.c.	50 c.c.	Apr. 6	50 c.c.	50 c.c.
" 16	50 c.c.	50 c.c.	" 16	50 c.c.	50 c.c.
" 26	50 c.c.	50 c.c.	" 26	50 c.c.	50 c.c.
May 4	50 c.c.	50 c.c.	May 4	50 c.c.	50 c.c.
" 11	50 c.c.	50 c.c.	" 11	50 c.c.	50 c.c.

The material used during this time was prepared by Dr. M. P. Ravenel and given by Dr. E. S. Deubler.

On May 20th the red cow aborted a still-born, half-term calf. The placenta was retained, but was removed the next day. After abortion, the cow rapidly emaciated. Her appetite was fickle. Later on she showed labored breathing, some coughing, and slight discharge from vagina. Two days before death she was unable to walk. She died on June 16, 1907, and was autopsied on June 17th at 3 P. M. The autopsy was made by Dr. Deubler, who reports as follows:

"Post-mortem changes were far advanced. Skin showed much edema. Thoracic cavity: Lungs and pleura: enormous masses of pearly tubercles

were found binding the chest wall to the lung over its entire extent, so that the ribs were torn from the lung with great difficulty. Both pleura were in a similar condition. Lungs contained many caseous foci from ¼ to 1 inch in diameter throughout their whole extent. These foci were of a whitish color and surrounded by a zone of congestion. The bronchial and mediastinal glands were all enlarged to three or four times their normal size, and on section were caseous throughout, the caseous material being whitish and of firm consistency and apparently containing fibrous tissue. Enormous numbers of tubercle bacilli were found on staining smears from the anterior mediastinal gland. Type not determined. Two slides preserved. Liver contained a large tuberculous abscess 4 by 5 by 6 inches. Portal lymphatic gland normal. Kidneys: Both kidneys were tuberculous, containing large caseous areas about one inch in diameter. Similar areas were found in each kidney.

"Uterus contained many foci of caseation, from pea-size to three times that size.

"Postpharyngeal lymphatic glands were enlarged and caseous on section. Brain removed, but no gross lesions found. Specimens of all the organs were brought to the laboratory, but were found to be so badly decomposed that further preservation was thought to be useless. These were destroyed, with the exception of one mediastinal gland and a section of kidney containing a large caseous area. These latter specimens were preserved in Kayserling solution. Two guinea-pigs, case No. 1042, were inoculated subcutaneously with an emulsion of the material from the center of a mediastinal gland on June 18, 1907. On June 20th one pig died showing a marked inflammatory reaction in the subcutaneous tissue. No other lesions found. Other pig living, July 3, 1907." (No report has been received on this pig.)

Histological report made by Dr. C. Y. White:

"Sections of the kidney through the tuberculous nodule show typical tuberculosis with giant-cells and an excess of fibroid tissue. Sections of the lymphatic glands show numerous areas of extensive tuberculosis."

"The bull to which the cow had been bred had not reacted to several tuberculin tests."

On June 17, 1907, "the black cow was removed to the box-stall in main barn, where some tuberculous cattle are kept. General condition fine. Thought to be pregnant." On July 23d the black cow was killed at the farm of the State Live-stock Sanitary Board. The autopsy was performed by Dr. C. Y. White, assisted by Drs. Deubler and Holmes. The autopsy report is as follows:

"Body of an exceptionally well-nourished cow. External appearance of skin normal. Subcutaneous fat exceptionally thick and of good normal condition. Internal appearances: Organs in their normal place. Thorax: Lungs—normal throughout and of a light pink color. Careful search of the lungs, and especially at the roots of the lungs, *i. e.*, the bronchial lymphatic glands, showed no evidence of tuberculous infection.

"The posterior mediastinal lymphatic glands, upper chain: The periphery of these glands shows three small 2 mm. caseous areas. This tuberculous infection in all likelihood is of recent origin, as the process is small and localized to one part of the gland. The gland was normal elsewhere. The lower group of the posterior mediastinal glands was normal.

"Heart: Normal.

"Pleuræ: Free from any evidence of tuberculosis. Absolutely normal.

"Abdomen: Organs in generally normal position.

"Liver: The liver is of a normal color and consistency. There are two very small 1 mm. yellowish areas directly beneath capsule. These are not of the general character of tuberculous lesions, but appear as thickening of the capsule.

"Gall-bladder: Normal.

"Kidneys: Both kidneys are of normal color and consistency and contain an excess of fat.

"Stomach and intestines normal.

"Mesenteric glands: Numerous glands were dissected and all were normal. Sections of the glands normal.

"Spleen: Normal color, size, and consistency. Section normal.

"Pancreas: Normal.

"Postpharyngeal glands: Both glands were slightly softened, but on section appeared normal.

"Sections of the lungs, liver, kidneys, mesenteric, posterior mediastinal, and postpharyngeal glands reserved for histological study."

Histological report made by Dr. C. Y. White:

"Liver: Liver-cells are slightly clouded and the organ shows slight congestion. Otherwise the organ is normal.

"Kidney: Sections of the kidney show slight congestion, especially marked in the medulla. Cells of the tubules show general cloudiness, but otherwise normal. In one area there is a moderate increase of interstitial tissue. Cells making up this tissue are young connective-tissue cells. There is no evidence of tuberculosis throughout the section.

"Spleen: Sections of the organ show moderate congestion. Malpighian bodies are large, slightly congested, normal in number. Trabeculæ are normal. Splenic pulp shows moderate congestion and shows areas of necrosis without inflammatory changes at their border. Throughout these necrotic areas large thick bacilli may be seen. These bacteria and the necrotic areas are in all likelihood post-mortem changes.

"Lungs: Sections of the lung show moderate congestion. In one area typical tubercle nodules showing large numbers of giant-cells and comparatively small amount of caseation.

"Lymphatic gland: Sections of the lymphatic gland show congestion in the central part of the gland. Around the periphery in the lymphatic tissue are extensive tuberculous areas, these areas showing giant-cells and caseation. In one tubercle central part shows calcification."

Bacteriological report by Dr. Holmes:

"July 24, 1907: Two guinea-pigs were inoculated this day with 1 c.c. each emulsion of mediastinal gland from cow killed on the State Live-stock

Sanitary Board farm, July 23, 1907. Both pigs were found dead morning of September 21, 1907.

"At autopsy lungs, liver, and spleen showed numbers of small yellowish areas ranging in size from pin-point to 2 mm. in diameter.

"Pathological histology of the organs of pig No. 98A showed (1) Lungs: Peri-bronchopneumonia, bronchitis, congestion, and a number of caseous areas, containing, however, no giant-cells. No tubercle bacilli were demonstrable. (2) Spleen: Marked necrosis and areas of caseation. No giant-cells were seen. No tubercle bacilli. (3) Liver: Showed practically the same thing as the spleen, together with marked fatty degeneration. (4) Kidney: Acute glomerulonephritis. No tubercle bacilli. No tubercles.

"The pathological histology of pig No. 98B. (1) Lungs: Marked active congestion, emphysema, slight edema, no caseation or tubercles, no tubercle bacilli. (2) Spleen: Shows marked necrosis, doubtlessly post-mortem. No tubercles. No organisms. (3) Liver: Passive congestion, moderate cloudy swelling, areas of focal necrosis. No tubercles, no tubercle bacilli, no areas of caseation. (4) Kidney: Showed post-mortem necrosis. No tubercle bacilli found."

Serum of the black cow was taken for the purpose of studying its agglutinating and immunizing qualities, but was lost through an accident to an employee.

Serum from the two cows was used by members of the staff up until the time when it was discovered that one of the cows had tuberculosis. The serum was preserved with cresol in sufficient quantity, in all probability, to have made it sterile. No serum was used after the cow was found to be tuberculous.

Twenty members of the staff used the serum on institute cases and in private cases. Most of the cases treated were reported in the Second and Third Annual Reports. The consensus of opinion of the men seemed to be that the serum had no special value. One of the men who had formed an unfavorable opinion, however, in the beginning was becoming enthusiastically favorable when the serum was withdrawn from use. He seemed to think that the last serum drawn was the best, and that it gave a reaction similar to that produced by tuberculin. The pathologist, Dr. C. Y. White, seemed to think that there was some evidence of unusual fibrosis in the serum cases which came to autopsy.

The chief point of interest in the work and experience of the Institute with the serum lies in the death of one of the cows from general extensive tuberculosis. It brings up the questions:

1. Can an animal give an immunizing serum and itself not be immune?

2. Does the withdrawal of serum from an animal deprive it of its protection against the tubercle bacillus?

El Tratamiento Por Suero de Maragliano en el Instituto de Henry Phipps.—(FLICK.)

Maragliano presentó un trabajo bajo los auspicios del Instituto de Phipps en el cual, el 28 de Marzo de 1904, anuncia lo siguiente:—"Primero, que es posible producir un tratamiento específico para la tuberculosis; segundo, que es posible inmunizar los animales contra la tuberculosis como se ha hecho con las otras enfermedades infecciosas y que hay razón de esperar una reacción anti-tuberculosa en el hombre."

El instituto envió Dr. M. P. Ravenel al laboratorio de Maragliano á estudiar el método. Dr. Leonard Pearson también fue á Europa á estudiar los métodos de otros investigadores en la preparación de los sueros.

El instituto importó una cantidad del suero de Maragliano para uso en el instituto, y tambien el Dr. Ravenel se dedicó á la preparación del suero de acuerdo can el método de Maragliano. Veinte miembros del instituto se dedicaron al empleo del suero. La opinión general de estos investigadores es que el suero no tiene valor específico.

Las vacas empleadas en la preparación del suero fueron sometidas á la prueba por la tuberculosis y se encontraron estar libres de la infección. Los animales fueron guardados contra la infección. Fueron inmunizados por medio de inyecciones del material recomendado por Maragliano. El suero obtenido de los animales en experimento parese ser tan satisfactorio como el suero importado.

El 16 de Junio de 1907, una de las vacas murio de tuberculosis general. La autopsia mostró una gran extensión de la infección. La otra vaca fue sacrificada y se encontró ligeramente afectada de tuberculosis.

La muerte de la vaca de tuberculosis general da lugar a las preguntas siguientes:—(1) Puede un animal dar un suero inmunizante sin que él este inmune? (2) La toma de suero de un animal puede privarle de la protección contra el bacilo de la tuberculosis.

Über die Behandlung mit Maragliano'schem Serum im Henry Phipps Institut.—(FLICK.)

Am 28. März 1904 hielt Maragliano, unter den Auspizien des Phipps Instituts, einen Vortrag, in dem er verkündete: (1) dass es möglich ist, eine specifische Behandlung für die Tuberkulose zu erzeugen; (2) dass es möglich ist, den tierischen Körper gerade so zu immunisiren gegen Tuberkulose wie gegen andere infectiöse Krankheiten, und dass ebensoviel Grund vorhanden ist, auf eine antituberkulöse Reaction beim Menschen zu hoffen.

Das Institut sandte Dr. M. P. Ravenel nach Maragliano's Laboratorium um seine Methoden zu studiren; beorderte auch Dr. Leonard Pearson

nach Europa, um die Methoden anderer in Bezug auf Serumbehandlung zu studiren.

Das Institut importirte das Maragliano'sche Serum für den Gebrauch in der Anstalt und beauftragte auch den Dr. Ravenel, das Serum nach Maragliano's Methode herzustellen. Zwanzig Mitglieder des Aerztestabes haben das Serum gebraucht und darüber Bericht erstattet. Alle die Herren stimmten darin überein, dass das Serum keinen specifischen Wert besitzt.

Die Kühe, welche zur Herstellung des Serums benutzt wurden, wurden auf Tuberkulose untersucht und sämmtlich frei davon befunden. Die Tiere wurden gegen Infection gehütet. Sie wurden durch Injectionen mit dem von Maragliano empfohlenen Stoffe immunisirt. Das von ihnen gelieferte Serum schien ebenso befriedigend zu sein, wie das importirte.

Am 16. Juni 1907 starb eine der Kühe an allgemeiner Tuberkulose. Es wurde bei der Autopsie gefunden, dass die Krankheit bei derselben sehr extensiv ausgebreitet war. Die andere Kuh wurde getödtet und nur leicht tuberkulös gefunden.

Das Sterben der Kuh an allgemeiner Tuberkulose regt zwei wichtige Fragen an: (1) Kann ein Tier ein immunisirendes Serum liefern und dabei selbst nicht immun sein? (2) Kann das Entziehen von Serum aus einem Tier dasselbe seines Schutzes gegen die Tuberkelbazillen berauben?

UNTOWARD EFFECTS FOLLOWING THE USE OF MARAGLIANO'S SERUM.

By H. R. M. Landis,
Philadelphia, Pa.

Within the past year instances of serious untoward effects following the use of diphtheria antitoxin have been quite numerous, and while recovery has been the rule, a few have ended fatally. In any event the symptoms of anaphylaxis or proteid hypersusceptibility are most alarming to both patient and physician.

These untoward effects are, at present, but ill understood, as they occur in man, although the phenomena following the injection of serum into animals have been carefully studied and described by Otto and by Rosenau and Anderson.

The minor manifestations of serum intolerance (skin eruptions, edema, joint pains) have been fully described by von Pirquet and Schick, and have been called by them "serum disease."

It has been shown that if a guinea-pig be injected with a single dose of horse serum, even in large quantities, no ill effects occur. If, however, after an interval of some days the animal is reinjected with serum, death almost always ensues. This hypersusceptibility to serum has been noted after a second dose so infinitesimal as 0.00001 c.c. Furthermore, an animal once sensitized apparently retains this hypersusceptibility throughout its life, and in the case of the female may transmit it to her offspring.

Immunity to this hypersusceptibility may be obtained in one of two ways: (1) by repeated injections of the serum during the period of incubation, that is, during the first ten days; or (2) by recovery from a second injection during the anaphylactic stage (Rosenau and Anderson).

In regard to the less serious evidences of hypersusceptibility—the "serum disease"—von Pirquet and Schick have shown that there is in man a normal period of incubation for the appearance of these phenomena, namely, eight to thirteen days. This first injection, however, renders the individual sensitive to future injections, so that if a second injection is given from fourteen days to four months after the first one, the evidences of serum disease occur almost at once, or at least within twenty-four hours. This they term the "immediate reaction." If the second injection is given after

an interval of four months, the reaction, while delayed from five to eight days, occurs earlier than the normal interval following the first injection, *i. e.*, eight to thirteen days. This they term the "accelerated reaction."

Thus while man reacts to an initial dose of the serum and the guinea-pig rarely does, they both react to second injection, although this reaction to the second dose differs in severity and kind.

These briefly stated facts are the essential features of proteid hypersusceptibility as they occur in man and the guinea-pig, and are important to bear in mind in analyzing the phenomena as seen in man following the use of Maragliano's serum.

It may be stated at this point that the following facts were submitted to Drs. Rosenau and Anderson, and while both of them unhesitatingly subscribe to the view that the symptoms described undoubtedly come within the category of anaphylaxis, they are unable to account for them. They state, however, that there are curious differences between man and the guinea-pig concerning modes of sensitization.

The present interest in anaphylaxis seems to warrant reporting the following facts, which are hereby submitted without any attempt toward explanation.

The use of Maragliano's serum was begun at the Phipps Institute in 1904. During this year but 5 cases were treated, the total number of injections given being 117. During the year 1905, 32 additional cases were treated; the total number of injections given to these 37 cases was 952. The details of 4 additional cases have been furnished to me by Drs. Trudeau and Ravenel. The number of injections given to these 4 cases was approximately 60, making the total number of injections for the 41 cases 1012. In addition, 97 doses were administered to 4 patients by mouth. The dose by mouth was 2 c.c.; that by the hypodermic, from 1 to 3 c.c. The frequency of the injections varied. Cases treated in the hospital and in private practice were injected every other day, while the dispensary cases, numbering 19, received two injections a week. Of the 41 cases treated by injections, 7 (17 per cent.) had alarming untoward symptoms, although none ended fatally.

Of the 7 cases with alarming symptoms, 6 presented nearly the same phenomena. Within a minute or two after the injection the patient's face became suffused and there was an expression of great anxiety. There was great difficulty in breathing and a sense of oppression, localized to a great extent over the precordium. The finger-tips became blue and the skin was covered with a clammy sweat. The pulse was very rapid (140 to 160) and almost imperceptible at the wrist. In 3 there was intense pain in the lumbar region; in 1 there was nausea and vomiting, and in 1 the patient screamed as the needle was withdrawn, became very pale, and had muscular

tremors. In all there was a feeling of impending death. In all the cases the phenomena passed off as rapidly as they began, and in a few moments the patients felt as well as ever. In 1 case the phenomena were atypical, and should perhaps be excluded. This patient became unconscious, had a feeble pulse and a sense of impending death two days after the sixth injection. Throughout the course of the treatment (27 injections) she was subject to these fainting attacks, although she never had them before or after the treatment.

In 4 of the cases the evidences of hypersusceptibility occurred but once, following the third, tenth, twentieth, and twenty-second injections. In 3, the injections were continued without further trouble. In 2 cases the evidences of hypersusceptibility occurred after two successive injections—third and fourth, tenth and eleventh. In one the treatment was discontinued, and in the other the injections were continued without further trouble.

The injections in all these cases were made every other day, as a rule. At times an interval of several days (later in the treatment) occurred, owing to enlarged glands.

The earliest case to react was one on the sixth day after the third injection; the latest on the fiftieth day after the twenty-second injection.

A study of these cases shows that, contrary to what one finds in guinea-pigs, the evidences of hypersusceptibility were extremely variable in their appearance, developing as they did at irregular intervals after the treatment was instituted. Furthermore, the frequent injections within the first ten days did not develop an immunity, nor did recovery from an attack of anaphylaxis prevent future attacks in two instances.

A fact that may have some bearing on the frequency with which the untoward effects occurred is that all of the cases had advanced or moderately advanced disease. On the other hand, the more favorable ambulant cases treated in the dispensary escaped the serious effects, but furnished 4 of the 6 instances of "serum disease."

Of the less serious manifestations of hypersusceptibility there were 6 instances in which the "serum disease" occurred. In 3 the eruption was urticarial; in 3 others the character of the eruption was not given. The eruption appeared after the fourth, fourth, sixth, sixth, tenth, and fifteenth injection respectively. In 2 the urticarial eruption was general; in 1 it was limited to enlarged and painful joints; in 3 the distribution of the eruption was not given. One of the cases, developing a rash and painful and enlarged joints (knees and elbows) after the fourth injection, had symptoms of marked hypersusceptibility after the twentieth injection.

Of the other phenomena noted in this series, herpes labialis occurred in 1, and a herpetic eruption about the site of the injection in 3.

There was a severe local inflammatory reaction at the site of the injection in 7. The adjacent glands became enlarged and painful in 10; in several cases the glands were so tender that the injections were stopped for four or five days. Severe joint pain was noted in 3 and lumbar pain in 2.

Efectos desfavorables consecuentes al Empleo del suero Maragliano.—(LANDIS.)

De cuarenta y un casos tratados con el suero de Maragliano, un 17 por ciento dieron pruebas marcadas de excesiva susceptibilidad (sufusión de la cara, disnea, opresión del corazón, pulso rápido, dolor lumbar, tremor de los músculos, sensación inminente de muerte cercana). Ningun caso fatal.

Estos casos difieren de los fénómenos observados en los cobayos en el tiempo indefinido de su aparecimiento. Ocurrieron después de la 3a, 10a, 20a y 22a inyección en cuatro de los casos. Las inyecciones se hicieron cada dos días y la dosis fué de uno á tres c.c.

En dos casos las muestras de susceptibilidad excesiva ocurrieron dos veces después de la 3a y 4a y después de la 10a y 11a inyecciónes. Hubo un caso atípicó, presentó síncopes y una sensación de muerte inminente. Estos ataques se mostraron continuamente durante el tratamiento que consistió en 27 inyecciónes.

Todas estos casos eran de pacientes con lesiones avanzadas ó moderadamente avanzadas que los obligaban á guardar cama. Los casos ambulantes en buena condición, no desarrollaron los fenómenos anteriores de anafiláxia; 4 de los 6 casos ambulantes presentaron los efectos desfavorables del suero. Seis casos presentaron erupciones de la piel después de la 4a inyeccion en dos, después de la 6a en dos más y después de la 10a y undecima en los dos restantes.

Los otros fénómenos que se notaron fueron: herpes labial en uno; erupción herpética en el lugar de la inyección, en tres; severa reacción inflamatoria en el lugar de la inyección en siete; las glándulas linfáticas se agrandaron y volvieron sensibles al tacto, en diez; dolores en las articulaciones, en tres, y lumbar en dos.

Les mauvais Effets de l'Emploi du Sérum de Maragliano.—(LANDIS.)

Sur 41 cas traités avec le sérum de Maragliano, 7 (17%) ont montré des signes d'une susceptibilité exagérée (visage congestionné, dyspnée, oppression dans la région du coeur, pouls rapide, douleur lombaire, tremblements musculaires, sensation de la mort imminente). Point de fatalités.

Ces cas diffèrent du phénomène anaphylactique vu dans le cochon

d'Inde, en ce que là il ne paraissait pas y avoir de temps défini quand il devait avoir lieu. Le phénomène anaphylactique apparut dans quatre cas après la 3 ème, la 10e, la 20e et la 22e injection. Les injections furent faites tous les deux jours; dose, 1 à 3 centimètres cubes.

Dans deux cas les signes d'hypersusceptibilité eurent lieu deux fois, après la 3e et la 4e et après la 10e et la 11e injection. Il y eut un cas atypique. La malade eut après la 6e injection des accès d'évanouissement et une sensation de mort imminente. Ces accès continuèrent tout le temps du traitement, qui consistait en 27 injections.

Dans tous ces cas, la maladie était avancée ou modérément avancée et les malades étaient au lit. Chez les malades plus forts et qui pouvaient marcher, l'anaphylaxie ne s'est pas développée; 4 sur 6 de ces derniers malades eurent la "maladie du sérum." Des éruptiones sur la peau apparurent dans 6 cas, après la 4e, la 4e, la 6e, la 6e, la 10e et la 15e injection.

Les autres phénomènes notés furent: herpès labial dans un cas; éruption herpétique autour du lieu de l'injection dans 3 cas; il y eut une réaction inflammatoire sévère à la place de l'injection, dans 7 cas; les glandes lymphatiques adjacentes s'enflèrent et devinrent douloureuses dans 10 cas; une forte douleur articulaire eut lieu dans 3 cas; une douleur lombaire dans 2 cas.

DE L'HYPERTENSION PASSAGÈRE COMME CAUSE DE CERTAINES HÉMOPTYSIES DES TUBERCULEUX:

LA MÉDICATION HYPOTENSIVE.

Par M. le Dr. René Gaultier,
Paris.

Au dernier Congrès de la tuberculose en octobre 1905 le Dr. Barbary montrait dans une communication nourrie de faits le rôle de la tension artérielle dans le mécanisme de certaines hémoptysies. Il établissait à l'aide de ses observations, prises le sphygmomanomètre en main *"que l'hémoptysie tuberculeuse est presque toujours fonction de l'hypertension artérielle,"* d'où sa conclusion qu'il est possible en surveillant cette tension d'en surveiller sa conséquence, l'hémoptysie. La thérapeutique qu'il proposait à cet effet était donc plutôt une *thérapeutique préventive* destinée à ne point voir s'élever la tension et par suite à ne point voir survenir l'hémoptysie, plutôt qu'une *thérapeutique curative,* médicamenteuse, par exemple, destinée à abaisser cette tension et à arrêter une hémoptysie survenue.

On avait cependant, Flick et Chelmonsky, préconisé l'emploi de la trinitrine et de l'iodure de potassium dans ce dernier but; F. Hare, Rouget, Lemoine, Bourlaud, avaient également proposé la nitrite d'amyle dont ils avaient obtenu des succès.

Nous-même, dès cette époque, ainsi que nous l'avons relaté pour la première fois à la Société de thérapeutique en juin 1906, nous utilisions à l'Hôtel-Dieu, dans le service du Pr. Dieulafoy dont nous avions l'honneur d'être alors le chef de clinique, une drogue que nous avions vue, entre les mains d'une commère, employée empiriquement pour guérir des hémoptysies tuberculeuses. Je veux parler *du gui de chêne,* que j'ai démontré cliniquement et physiologiquement être un médicament hypotenseur très puissant, d'une régularité et d'une durée d'action très intense, en même temps que d'une faible toxicité; je faisais donc dès ce moment *avec le gui une thérapeutique active curativè, hypotensive des hémoptysies tuberculeuses,* et je pouvais écrire alors dans ce travail préliminaire la phrase suivante: *"Sans vouloir prématurément vanter les vertus curatives du gui de chêne dans les hémoptysies des tuberculeux, nous avons pu constater que dans sept cas où l'hémoptysis était de nature congestive, hémoptysie active pourrait-on dire, le gui de chêne s'est montré efficace; nous relevons encore dans ces observations te fait curieux à*

signaler de l'abaissement de la pression artérielle et de l'accélération des battements cardiaques qui s'est montré quatre fois en corrélation avec l'administration du médicament. *Il y a peut-être là une indication de son mode d'action que nous avons cherché à vérifier par des travaux expérimentaux et ceux-ci nous ayant permis de constater la baisse constante et durable de la tension artérielle, nous croyons que cette action physiologique permet d'expliquer les bons effets de la drogue.*"

Ces conclusions que je tirais alors de mes observations cliniques et expérimentales sont les mêmes que celles qu'aujourd' hui je désire développer, fort d'un plus grand nombre de résultats personnels et de résultats étrangers obtenus avec le gui, et aussi en m'appuyant sur des résultats analogues publiés depuis peu et obtenus avec d'autres substances hypotensives.

En effet Pouliot, Crace-Calvert, Pic et Petitjean, Dieuzeide et tout récemment le Dr. Guinard, du sanatorium de Bligny, passant en revue devant la Société d'études scientifiques sur la tuberculose le mode d'action des procédés employés dans le traitement des hémoptysies, ont apporté des faits nombreux de guérison par le nitrite d'amyle. Aussi ce dernier auteur conclut-il "*que tout procédé pouvant développer une action vasodilatatrice rapide et puissante avec baisse générale de la tension sanguine sera un procédé précieux pour suspendre promptement une hémoptysie pulmonaire.*" Au cours de la discussion qui suivit cette communication le Dr. Rénon se rallia à cette opinion et déclara que depuis trois ans sa préférence allait dans des cas aux hypotenseurs, et le Dr. Bezançon soutint à son tour que les médications actives sont celles qui agissent par vasodilatation générale, et parmi elles il recommanda l'emploi de la trinitrine.

En voilà assez, je pense, pour démontrer les effets de la médication hypotensive dans le traitement des hémoptysies; et il suffira d'apporter la démonstration du rôle hypotenseur du gui pour apporter du même coup la justification de son emploi dans les hémoptysies, emploi que nous préconisons depuis tantôt trois ans.

Ce rôle hypotenseur du gui, nous l'avons démontré cliniquement et physiologiquement pour la première fois dans notre communication à la Société de thérapeutique de juin 1906. Depuis nous en avons apporté au Congrès de médecine de Paris en octobre 1907 des nouveaux faits cliniques et à l'Académie des sciences en novembre de la même année des faits expérimentaux qui ont démontré à la fois son mode d'action générale et précisé son mécanisme; *son mode d'action générale*, c'est-à-dire *l'hypotension*, et *son mécanisme*, c'est-à-dire *la preuve que cet effet est sous une influence centrale.*

Depuis d'autres auteurs ont confirmé ces premières observations; je citerai d'abord le Dr. Chevalier qui nous aida un moment au laboratoire du Pr. Pouchet dans quelques-unes de nos recherches expérimentales, puis le Dr. Breton Oliveau qui, sous la direction du Pr. Lefour, de Bordeaux, soutint

sa thèse en 1908 sur les effets hypotenseurs du gui dans le traitement de l'hypertension des albuminuries gravidiques; le Dr. Vachez qui dans le service du Dr. Florand utilisa son action hypotensive dans le traitement des artérioscléreux et des brightiques, et en publia le résultat dans sa thèse de Paris en 1908; enfin nous citerons encore le Dr. Rénon qui à la Société de la tuberculose pulmonaire en juin 1908 reconnaît dans cette phrase les bons effets du gui: "*En prescrivant, dit-il, chaque jour de 2 à 3 pilules de 0 gr. 05 d'extrait aqueux de gui, en injectant 0 gr. 20 de cet extrait dans 1 c.c. de sérum physiologique, injection d'ailleurs assez douloureuse, j'ai vu la tension artérielle s'abaisser notablement et les hémoptysies s'arrêter.*"

C'est en effet, après avoir essayé des extraits alcooliques et des extraits éthérés, à l'*extrait aqueux de gui* que nous nous sommes arrêté pour traiter les hémoptysies tuberculeuses, soit que nous l'employons en pilules de 0 gr. 05 à la dose de 0 gr. 30 par jour, 1 pilule toutes les deux heures dans la journée, auxquelles nous ajoutons pour la nuit une cuillerée de sirop de morphine, soit quand nous voulons agir rapidement en solution physiologique dont nous avons donné la formule avec Delassus à la Société de thérapeutique en juin 1907.

"Quand on vit, nous dit le Dr. Dieuzeide, dans un milieu de malades atteints de tuberculose pulmonaire, et que l'on suit quotidiennement les phases de leur maladie, on en arrive bientôt à penser que, parmi les multiples accidents auxquels le tuberculeux est exposé, l'hémoptysie est le plus redoutable." C'est pour cela et pour avoir vécu nous aussi dans un semblable milieu, que, *témoin des résultats obtenus avec l'emploi du gui, médicament hypotenseur, dans les hémoptysies tuberculeuses, si souvent fonction d'une tension artérielle déréglée,* nous avons tenu à vous en apporter ici à nouveau l'affirmation, certain qu'à votre tour en l'utilisant chez vos malades, tout comme MM. Rénon, Vachez, Breton Oliveau et autres, vous pourrez conjourer cet accident, banal en lui-même, mais que ses conséquences rendent parfois si redoutable.

SECTION II.

Clinical Study and Therapy of Tuberculosis. Sanatoriums, Hospitals, and Dispensaries (*Continued*).

FOURTH DAY. MORNING SESSION.
Thursday, October 1, 1908.

A Symposium on

SANATORIUMS, HOSPITALS, DISPENSARIES, AND HOME TREATMENT FOR THE TUBERCULOUS.

Section II of the International Congress on Tuberculosis was called to order by the President, Dr. Vincent Y. Bowditch, at half-past nine o'clock.

LE FONCTIONNEMENT DU SANATORIUM DE BLIGNY.

ŒUVRE DES SANATORIUMS POPULAIRES DE PARIS, 1903–1908.

PAR MM. L. LANDOUZY ET L. GUINARD,
Paris.

Le premier sanatorium, ouvert pour les hommes, à Bligny, près Versailles, par l'Œuvre des sanatoriums populaires de Paris, compte actuellement cinq années de plein fonctionnement. Nous donnons un résumé des principaux faits observés, au triple point de vue économique, moral et médical, dans cette fondation d'initiative privée, reconnue d'utilité publique.

L'installation du sanatorium a été faite dans un très beau parc de 85 hectares, sans luxe inutile, mais avec tout le confort voulu pour que l'établissement fût à la fois très agréable et très hygiénique.

Le prix de revient du lit atteint environ 9.200 francs, ce qui ne saurait être considéré comme un chiffre excessif, étant donné que certaines dépenses auraient pu à coup sûr être facilement réduites. Mais, en engageant ces

dépenses, les bienfaiteurs et fondateurs de notre Œuvre, qui apportaient leur argent et leur peine, tenaient à satisfaire à certaines idées qui, de l'établissement construit, devaient faire plus qu'une simple maison de cure à la campagne; ils voulaient faire une maison modèle, ouverte d'abord aux hommes, ensuite aux femmes, pour combler ainsi une regrettable lacune existant dans notre armement antituberculeux.

Les fondateurs auraient pu, notamment: I° réduire considérablement sur le prix du terrain; 2° se dispenser d'installer des services médicaux et des laboratoires d'études aussi parfaitement outillés que ceux que nous possédons, et qui ont coûté plus de 50.000 francs; ils auraient, enfin, pu réduire sur certains frais de détail qu'on peut, au bas mot, estimer à environ 77,000 francs.

Du reste, à Bligny, les services généraux ont été préparés en vue de fournir à trois ou quatre grands services, et l'on pressent quelle réduction importante nous réaliserons dans le prix de revient définitif, quand le but total de l'Œuvre sera atteint sur le domaine très étendu que nous occupons.

Si donc, pour les raisons précédentes, nous sommes arrivés à dépenser 9200 francs par lit, nous tenons à faire remarquer que ce chiffre ne saurait être considéré comme normal, car, conformément aux conclusions du Rapport que l'un de nous a présenté, l'année dernière, à la réunion de l'Association internationale de Vienne, nous persistons à penser que: en se limitant au strict nécessaire pour l'installation confortable et hygiénique des malades à la campagne; en choisissant un emplacement bon marché (ne comportant pas trop de frais d'aménagement, ni d'excédent de dépenses pour les transports), un sanatorium populaire peut être édifié et mis en train, en France, pour 5000 à 6000 francs par lit.*

Années.	Cout d'une Journée de Malade (tout compris, frais généraux, alimentation).	Moyenne de Dépense Alimentaire (par tête et par jour), personnel compris.
1904	4 fr. 66	1 fr. 78
1905	4 fr. 14	1 fr. 76
1906	4 fr. 01	1 fr. 64
1907	3 fr. 62	1 fr. 50
1908	3 fr. 43	1 fr. 39

Pourtant, au point de vue économique, nous subissons défavorablement, à Bligny, l'influence du voisinage de Paris qui augmente le prix de certaines matières premières et, d'autre part, notre éloignement des gares élève considérablement le coût de nos consommations; certains transports, particulièrement celui du combustible, étant assez onéreux.

Malgré cela, et sans aucun préjudice pour le bien-être des malades, nous sommes arrivés progressivement à un prix de journée que nous considérons comme digne de retenir l'attention, car après avoir examiné les

* L. Guinard: Le coût et les frais des sanatoriums populaires français.

chiffres ci-dessous, on ne pourra plus reprocher aux sanatoriums de coûter trop cher.

Voilà donc un premier point bien établi.

Grâce à des marchés très surveillés, à des économies judicieuses et à l'augmentation progressive du nombre de journées de présence, nous arrivons à un prix de revient très modéré, et ce n'est pas trop pour anoncer que de prévoir encore une diminution. En effet, quand notre nouveau sanatorium de femmes sera en plein fonctionnement, nous avons la certitude, qu'à Bligny, avec deux cent cinquante lits, nous pourrons faire tomber le prix global de journée à 3 fr. 20 ou 3 fr. 25.

Dans ces conditions: "Puisque le coût d'une journée de sanatorium est à peine plus élevé que celui d'une journée dans les hôpitaux parisiens (quand il n'est pas inférieur), on en arrivera, je l'espère, à trouver plus logique de consentir, en faveur des tuberculeux admissibles dans les établissements ruraux, une partie des sacrifices d'argent imposés pour l'hospitalisation urbaine des poitrinaires, qui, le plus souvent, n'entrent dans les hôpitaux, que pour y longuement mourir."

Les résultats de cure que nous avons enregistrés, depuis le début, valent tout naturellement ce que vaut le recrutement de nos malades; et, à cet égard, nous ne surprendrons personne en rappelant que, pour des raisons multiples, les tuberculeux se soignent toujours trop tard et ne nous arrivent, la plupart du temps, qu'à un degré assez avancé de la maladie.

Dans le tableau ci-dessous, où les malades entrés au sanatorium, du 8 août 1903 au 8 août 1908, sont classés par année et par degré de tuberculose, on verra quelle proportion considérable de sujets atteints au troisième degré nous avons, bien malgré nous et malgré nos Règlements, dû recevoir. Sans compter que parmi les malades de cette catégorie beaucoup étaient en très mauvais état général.

NOMBRE ET ÉTAT DES MALADES ENTRÉS, DU 8 AOÛT 1903 AU 8 AOÛT 1908.

Années	1er degré.	2e degré.	3e degré.
1903–1904	32 = 16,08 p. 100	23 = 11,55 p. 100	144 = 72,36 p. 100
1904–1905	36 = 22,95 —	30 = 19,10 —	91 = 57,96 —
1905–1906	44 = 24,44 —	35 = 19,44 —	101 = 56,11 —
1906–1907	34 = 22,36 —	29 = 19,07 —	89 = 58,55 —
1907–1908	32 = 24,42 —	12 = 9,16 —	87 = 66,41 —

En résumé, les 819 malades entrés au sanatorium de Bligny, du 8 août 1903 au 8 août 1908, comprennent:

178 malades au premier degré, soit 21,85 p. 100;

129 malades au deuxième degré, soit 15,74 p. 100;

512 malades au troisième degré, soit 62,51 p. 100.

Dans de telles conditions, comme on ne peut comparer que ce qui est comparable, personne ne pense que le résultat à attendre de tuberculeux

avancés puisse être mis en parallèle avec celui que l'on obtient des tuberculoses au début. Nous rendrons donc compte de ces résultats, par degré de maladie, en faisant remarquer, de plus, que, dans nos chiffres, se trouvent éliminés les malades qui n'ont fait qu'un séjour insuffisant au sanatorium et, par conséquent, n'ont pas fait de cure effective.

Du 8 août 1903 au 8 août 1908, 616 malades sont sortis du sanatorium, comprenant:

136 malades au premier degré;
133 malades au deuxième degré;
347 malades au troisième degré.

A) Des 136 malades, au premier degré, ayant fait une cure:

118 ont obtenu un résultat *très bon*, soit 86,76 p. 100.
17 — — *bon*, — 12,50 —
1 *nul* — 0,74 —

B) Sur les 133 malades, au deuxième degré, ayant fait une cure:

25 ont obtenu un résultat *très bon*, soit 18,79 p. 100.
69 — — *bon*, — 51,87 —
28 — — *assez bon*, — 21,05 —
8 — — *médiocre*, — 6,01 —
3 *nuls* — 2,25 —

C) Des 347 malades, au troisième degré, ayant fait une cure:

48 ont obtenu un résultat *bon*, soit 13,83 p. 100.
102 — — *assez bon*, — 29,39 —
69 — — *médiocre*, — 19,88 —
128 *nuls* — 36,88 —

Par cure "très bonne," nous entendons une cure ayant donné un résultat parfait, tant au point de vue de l'état général qu'au point de vue de l'état local; laissant l'espoir, qu'avec les précautions de rigueur, le malade a toute chance pour ne pas récidiver.

Par cure "bonne," nous entendons une cure ayant donné des résultats satisfaisants au point de vue général, mais dont les effets, du côté pulmonaire, ne sont pas aussi complets, laissant subsister quelques signes d'auscultation autres que les seules modifications de réparation. Dans cette catégorie, se trouvent les malades qui auront beaucoup plus de précautions, a prendre pour éviter un retour agressif de la maladie.

Par cure "assez bonne," nous entendons une cure ayant donné toutes satisfactions d'ensemble, surtout au point de vue général, mais dont les résultats, au point de vue pulmonaire, sont très imparfaits et laissent subsister des craintes sérieuses pour l'avenir.

Par cure "médiocre," nous entendons une cure incomplète aussi bien

au point de vue général qu'au point de vue local, ayant cependant donné quelques améliorations, améliorations insuffisantes pour assurer un bénéfice quelconque dans l'avenir.

Par résultat "nul," nous comprenons, comme l'indique suffisamment l'expression, tous ceux se rapportant aux malades qui n'ont subi aucune influence modificatrice de la cure; qui se sont même aggravés, sont morts en cours de traitement, ou sont destinés à mourir peu de temps après leur sortie.

Nous arrivons donc à un total de:

143 résultats très bons,
134 résultats bons,

estimant, sans aucune exagération, que ces derniers ont une réelle valeur, car si nous les envisagions surtout au point de vue économique, nous pourrions les considérer comme très bons. En effet, les malades qui les ont obtenus ont récupéré leur entière capacité de travail, et la plupart d'entre eux peuvent espérer la conserver longtemps, surtout s'ils se conforment aux règles d'existence qu'on leur enseigne au sanatorium.

Enfin, nos 130 résultats qualifiés assez bons sont-ils négligeables?

Nous ne le pensons pas, car dans les conditions où ces cures imparfaites ont été obtenues, elles ont donné satisfaction à ceux qui en ont bénéficié, et dont quelques-uns profitent au delà de nos prévisions.

Si nous éliminions de notre statistique les tuberculeux pour lesquels, dès l'entrée, il était absolument impossible d'espérer la moindre amélioration, si, par conséquent, nos efforts avaient porté uniquement sur des malades curables ou améliorables, nous inscririons le chiffre intéressant et très sûr de 68,05 p. 100 de bons résultats.

D'après le compte rendu precédent, on peut facilement voir ce que sera le rendement de notre sanatorium le jour où nous pourrons y recevoir les seules catégories de tuberculeux correspondant exclusivement aux cas susceptibles de guérison ou d'amélioration.

Mais nous ne devons pas regretter outre mesure d'avoir accepté, au sanatorium, certains tuberculeux à un degré trop avancé; car, ce faisant, nous avons quand même rendu service: soit en sortant d'un foyer un tuberculeux qui pouvait contaminer toute une famille; soit en soulageant une misère lamentable qui ne trouvait secours nulle part, et se voyait refuser l'entrée des services hospitaliers.

D'ailleurs, l'expérience nous a appris que nombre de malades au deuxième et même au troisième degré, possédant encore des forces défensives importantes, n'auraient pas l'avantage de les utiliser, et parfois de se sauver, si nous leur refusions systématiquement le moyen de se soigner logiquement, et de profiter des ressources précieuses de nos organisations.

Quant aux résultats éloignés, c'est-à-dire ceux que l'on peut encore observer après la sortie du sanatorium, ils ont presque confirmé nos prévisions. En nous limitant aux malades sortis en 1904, 1905, 1906, sur lesquels il nous a été possible d'avoir des renseignements précis, nous arrivons au résultat suivant:

A) Malades sortis en 1904:
45 sont en bonne santé et n'ont pas rechuté,
1 aggravé,
36 décédés,
22 perdus de vue ou sans renseignements précis.

B) Malades sortis en 1905:
77 sont en bonne santé et n'ont pas rechuté,
14 aggravés,
33 décédés,
27 perdus de vue ou sans renseignements précis.

C) Malades sortis en 1906:
80 sont en bonne santé et n'ont pas rechuté,
7 aggravés,
34 décédés,
25 perdus de vue ou sans renseignements précis.

Le nombre des décès que nous trouvons ne suprendra personne si l'on veut bien se rappeler quelle proportion énorme de troisième degré nous recevons, et se souvenir surtout que, pour ce motif, 160 malades de cette série sont sortis du sanatorium avec résultat absolument nul ou médiocre, c'est-à-dire sans aucune valeur.

Sauf de très rares exceptions, ce sont ces malades qui ont fourni la généralité des 103 décès inscrits dans les tableaux précédents.

Au total, nous trouvons donc 202 anciens pensionnaires du sanatorium, soit 50,37 p. 100 ayant conservé le bénéfice de leur cure, parmi lesquels 45, sortis depuis 1904, peuvent être considérés comme ayant fourni une preuve suffisante de la fixité du résultat.

Si, à ces 202 malades sortis à fin décembre 1906, nous ajoutons les 69 très bons résultats obtenus du 1 er janvier 1907 au 8 août 1908, nous pouvons dire, sans rien exagérer, que le sanatorium a rendu à la santé et à l'existence commune, au moins 271 tuberculeux.

On remarquera que, jugeant toujours très sévèrement les résultats de cure, nous négligeons encore les pensionnaires que nous considérons comme sujets à caution, parmi lesquels probablement, surtout dans les résultats bons des derniers mois, se trouveront des sujets, qui, dans l'avenir, viendront augmenter notre effectif de "rescapés."

Puis enfin, parmi les 74 pensionnaires sur lesquels nous manquons de renseignements précis, ou que nous avons perdus de vue, il en est un certain nombre qui sont sortis du sanatorium dans de très bonnes conditions, et que nous serions en droit de considérer comme pouvant, eux aussi, augmenter le nombre des bons résultats éloignés que nous enregistrons plus haut.

Pour terminer cet exposé, nous soulignerons quelques particularités dignes de remarque.

Contrairement à ce que certains pensent et écrivent, l'économie d'un sanatorium, comme celle de toute maison de cure cliniquement conduite, n'applique pas des formules toutes faites. . . A Bligny, les détails de la vie des pensionnaires, le repos, la promenade, le travail manuel, l'aération, le jeu, l'alimentation, aussi bien que les médicaments (ceux-ci réduits au strict nécessaire), sont prescrits *pro die, et ad hominem.*

Au sanatorium, la cure est faite d'opportunisme modifiable suivant les réactions des tuberculeux mis aux prises avec chacun des éléments thérapeutiques, représentés:

1° Par le *milieu cosmique:* ciel, sol, climat, air, sous lequel, sur lequel et au milieu duquel repose la maison;

2° Par le *milieu humain,* plein de radiations bienfaisantes, dans lequel baigne, sans le savoir, le sanatorié: ascendant et réconfort exercés par le médecin en contacts incessants avec ses clients; émulation des malades auxquels on apprend à se soigner; contagion de l'exemple; contagion de la foi en la guérison; apprentissage respiratoire mutuel; éducation d'hygiène générale par les leçons de choses vécues au sanatorium;

3° Par le *milieu diététique,* l'alimentation étant surveillée avec le même soin que le serait un médicament; avec la préoccupation d'obtenir du malade une digestion et une assimilation *optima,* plutôt qu'une suralimentation; la suralimentation, par elle-même, n'assurant rien moins que la surassimilation et la surnutrition.

Nous insistons beaucoup pour faire remarquer qu'au sanatorium nous nous abstenons absolument de faire de la suralimentation, estimant qu'il serait inutile de sauver les malades de la gastrite thérapeutique pour les faire tomber dans la gastrite alimentaire.

La mise en œuvre des facteurs essentiels de la cure, n'est donc pas contenue dans l'application pure d'une formule simpliste, mais dans l'individualisation d'une méthode générale que l'on doit adapter et non pas imposer à ceux qui doivent en bénéficier.

Nous nous efforçons encore de remplir un autre devoir, car, pour primordiale que soit la tâche du sanatorium de remettre en état de santé, et d'éduquer les tuberculeux curables; on conçoit, qu'immédiatement et par surcroît, le sanatorium doive travailler à la Prévention de la tuberculose.

Par l'éducation hygiénique reçue dans la maison de cure, nuls ne deviendront, à l'atelier, au bureau, au magasin, comme dans la famille, meilleurs propagandistes que les pensionnaires du sanatorium après y avoir, durant de longs mois, reçu les conseils du médecin, et vécu les leçons de choses données par l'enseignement mutuel.

Comptant beaucoup sur le résultat de cette propagande, nous nous sommes efforcés d'instruire nos malades, de manière à ce que, sortis de chez nous, ils soient des agents éclairés de l'hygiène et de la prophylaxie antituberculeuse. Des causeries familières sont faites de temps en temps, et ces causeries, réunies en une brochure éditée par la maison Masson, sont remises à la sortie à chaque pensionnaire à fin de cure.

De cet exposé des résultats d'un sanatorium, nous croyons devoir tirer les enseignements suivants:

Quand médecins et philanthropes seront bien convaincus du rang que doit tenir le sanatorium dans l'assistance des poitrinaires; quand ils comprendront tout le bien que l'on peut y faire, alors ils y viendront mieux informés, cessant de reprocher à ces établissements de coûter cher.

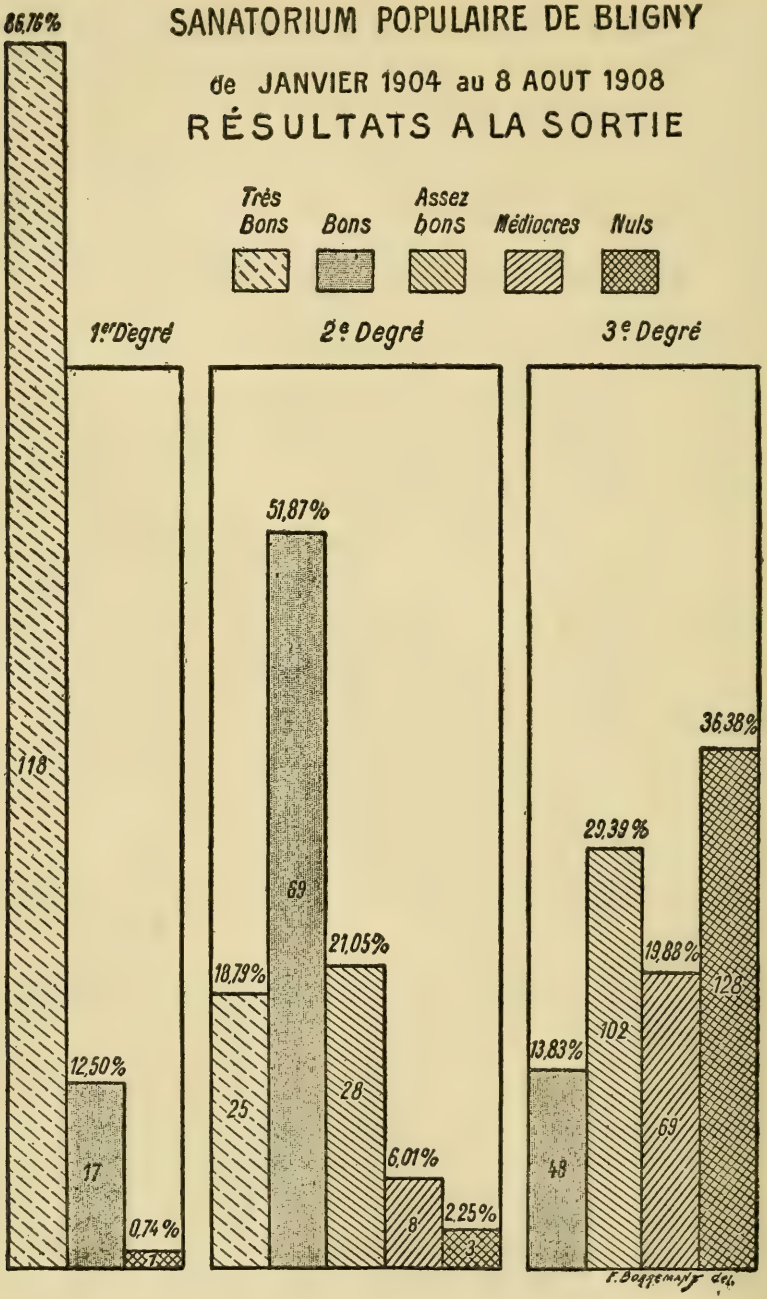
Non seulement, d'après les nombreux cas de tuberculose au troisième degré et très avancés que nous avons reçus; mais aussi d'après la proportion considérable de malades refusés à l'examen d'admission, on constate que le corps médical n'est pas prêt encore de signaler aux intéressés combien il leur importerait de se soigner à la moindre défaillance de santé; les avertissant de la nécessité absolue qu'il y a pour eux à s'arrêter et à se soigner dès le début du mal; alors que les lésions sont tout à fait commençantes. S'ils agissaient ainsi, les médecins rendraient d'immenses services à la lutte contre la tuberculose, car ils contribueraient à rendre bien supérieurs les excellents résultats que donne toujours une cure entreprise au bon moment.

Il est évident que, en France notamment, les médecins et le grand public ne connaissent pas encore les principes essentiels de cette importante partie de la lutte antituberculeuse. . . qui consiste à soigner les malades en temps utile.

Tout le monde est parfaitement d'accord sur la valeur primordiale des mesures d'hygiène, de prophylaxie et de préservation des sujets sains qui, bien appliquées, rendent et rendront tous les services que l'on peut en attendre dans la lutte contre la tuberculose.

Quant à ce que l'on peut entreprendre pour soigner les tuberculeux curables ou améliorables, il n'y a pas lieu d'être aussi rassuré; car, de ce côté, ce qui se fait chez nous à l'heure actuelle est d'une parfaite insuffisance, et, comme nous venons de le dire, les malades, pas plus que les médecins, ne s'entendent pour nous aider.

Les conditions logiques de la cure de la tuberculose sont ignorées du grand public; ce n'est que beaucoup trop tard, que les malades consentent


SANATORIUM POPULAIRE DE BLIGNY
de JANVIER 1904 au 8 AOUT 1908
RÉSULTATS A LA SORTIE
Très Bons
Bons
Assez bons
Médiocres
Nuls
1er Degré
2e Degré
3e Degré
86,76%
118
12,50%
17
0,74%
1
51,87%
69
18,79%
25
21,05%
28
6,01%
8
2,25%
3
36,38%
128
29,39%
102
19,88%
69
13,83%
48
F. Boggemann del.

généralement à se soigner; et un très grand nombre de ceux qui auraient pu, ou voulu, le faire déclarent n'avoir pas été prévenus, ni suffisamment mis au courant par leur médecin.

Comment expliquer que sur les 670,000 habitants que compte le département de Seine-et-Oise, on ne trouve pas dix tuberculeux curables, par année, pour profiter des lits fondés au sanatorium de Bligny par le Conseil général de ce département?

De même encore, sur les 25 lits entretenus à Bligny par quatre de nos grandes Compagnies de chemins de fer français, et, malgré les avantages accordés aux employés et à leur familles pendant toute la durée de la cure, 20 ou 21 sont habituellement occupés, et encore dois-je noter que 54 p. 100 des tuberculeux, qui nous ont été envoyés jusqu'ici, étaient au troisième degré de la maladie!

Le public est bien averti des ravages que fait la tuberculose et des précautions à prendre vis-à-vis des malades; mais la manifestation la plus évidente de tout cela, est une véritable phobie, une crainte irréfléchie des tuberculeux qui aboutit aux pires des procédés à l'égard de ces malheureux, considérés et traités, dans certains milieux, comme des pestiférés.

Il est indispensable, maintenant, de faire la plus active propagande pour répandre partout la notion de la curabilité des formes communes de la tuberculose, et de dire très haut combien grandes sont les chances de guérison, *quand la maladie est soignée à son extrême début.*

Il faudrait aussi convaincre tous les médecins de la nécessité du diagnostic précoce de la tuberculose, et leur persuader, comme nous le disions plus haut, qu'ils doivent non seulement prévenir de suite les intéressés, mais les avertir de l'utilité absolue qu'il y a pour eux à se bien soigner immédiatement.

Nous concluons donc en faisant remarquer que la partie de la lutte contre la tuberculose qui consiste à consacrer une certaine somme d'efforts au traitement logique et précoce des malades, n'existe pour ainsi dire point en France; d'abord, parce que les malades ne s'y prêtent généralement pas, au moment et dans les conditions voulues; ensuite, parce que les médecins eux-mêmes—pour une foule de raisons qui ne sont rien moins que fondées—ne semblent pas actuellement disposés à seconder efficacement pareil effort tenté dans cette direction.

L'ISOLEMENT DES TUBERCULEUX PAUVRES DANS LES HÔPITAUX GÉNÉRAUX.

PAR DR. MAURICE LETULLE,
Paris.

En France, les conditions défectueuses de la vie sociale actuelles obligent les municipalités à receuillir les pauvres malades dans des hôpitaux, au lieu de les soigner "à domicile."

L'"isolement" des tuberculeux, afin de protéger réciproquement les malades "non-tuberculeux" et les "bacillaires," est obligatoire dans nos hôpitaux français; à Paris, cet isolement n'est pas encore régulièrement appliqué.

Chargé, depuis onze années, à l'hôpital Boucicaut, du premier service médical, dans lequel l'isolement des tuberculeux ait fonctionné d'une manière obligatoire, j'ai pu faire l'expérience de la méthode et en connaître les effets. Dix milles malades touchés par le bacille de Koch ont passé dans mon service. Deux pavillons réservés aux maladies des voies respiratoires et ne comportant que 69 lits, ont été notoirement insuffisants pour assurer l'isolement de tous les phtisiques. Cet isolement a donc été incomplet, et j'ai du conserver dans mes autres pavillons (consacrés aux maladies générales) un grand nombre de malades expectorant des bacilles de Koch.

Pour ce qui est des tuberculeux isolés, les conditions materielles de la construction de chacun de mes deux pavillons (41 lits pour hommes, et 28 lits pour femmes) ne permettent pas la séparation méthodique des malades, selon le degré de leur affection, ce qui est, cependant, le desideratum fondamental de l'isolement hospitalier des tuberculeux. Les malades encore au début et n'ayant pas de bacilles dans leur expectoration (ou même n'expectorant pas) ne doivent pas se trouver en traitement dans la même salle que les malades atteints de "tuberculose ouverte." Et parmi ces derniers, il est indispensable de faire deux parts, bien distinctes qui ne devront jamais, non plus, être mêlées en commun dans une salle d'Hôpital; d'un côté, les tuberculeux considerés encore comme curables, c'est à dire susceptibles de bénéficier largement et vite de la cure hygièno-diététique du sanatorium; de l'autre, les phtisiques avancés et les vieux tuberculeux expectorants atteints,

en plus, de sclérose pulmonaire et d'emphysème chronique, qui sont, à proprement parler, des malades bons pour un "hospice de chroniques."

Cette sélection des malades en trois classes distinctes est indispensable dans l'hôpital général qui reçoit des tuberculeux. Il faut, de toute necessité, organiser cet "isolement spécial en trois groupes" et en assurer le triage dès les premiers jours de l'administration de tout tuberculeux hospitalisé. Une pareille mesure s'impose non seulement à cause des conditions économiques et des frais d'entretien des malades (autrement couteux quand il s'agit d'un tuberculeux curable, que d'un phtisique avancé), mais encore à cause des conditions morales auxquelles se trouvent condamnés les "curables" en voyant mourir sous leurs yeux, chaque jour, et à côté d'eux les poitrinaires incurables admis dans la salle commune. Cette douloureuse impression, fréquemment réitérée, déprime le courage de ceux qui veulent et qui pourraient encore guérir, et produit parfois les pires résultats. J'ai pour ma part, assisté au suicide de plusieurs hommes tuberculeux hospitalisés depuis de longs mois à Boucicaut. Un même découragement, une même tristesse morne envahit peu à peu les autres; si bien, qu'au bout de quelques semaines de séjour dans mes salles, tous les malades finissent par avoir un même air de famille et par se ressembler!

Conclusions.

1. L'isolement des "tuberculeux ouverts" recus dans les hôpitaux consacrés aux maladies générales est nécessaire.

2. Cette "mesure de préservation collective" doit être prise de façon à ne pas nuire aux tuberculeux pauvres qui nous confient le soin de leur santé.

3. La cure d'un tuberculeux hospitalisé doit être double: "hygiéno-diététique," assurément, et aussi complète que dans un sanatorium, mais également "morale."

4. Il est donc indispensable d'assurer aux tuberculeux reconnus comme "curables" la joie de vivre et l'espoire de guérir.

5. La sélection des tuberculeux hospitalisés doit se faire en trois "divisions administratives" distinctes et sans communications journalières entre elles, de façon à bien isoler les uns des autres (*a*) les tuberculeux au début sans expectoration; (*b*) les tuberculeux "ouverts" jugés encore curables et après au traitement du sanatorium; (*c*) les "phtisiques chroniques," n'ayant désormais besoin que des secours de l'"hospice."

6. La sélection de ces trois classes de tuberculeux hospitalisés doit être déterminée aussi tôt que possible. Dans ce but, tout malade suspecté de tuberculose pulmonaire doit être mis, tout d'abord, de son admission, à part dans une chambre isolée, en attendant que le diagnostic médical soit suffisamment établi.

Absonderung der lungenkranken Armen in den allgemeinen Krankenhäusern.—(LETULLE.)

1. Die Absonderung der "offenen Tuberkulösen" in allgemeinen Krankenhäusern ist unerlässlich.

2. Diese "Collectiv-Präservationsmassregel" muss in solcher Weise ausgeführt werden, dass den tuberkulösen Armen, die uns ihre Gesundheit anvertrauen, dabei kein Schaden zukommt.

3. Die Behandlung eines Lungenkranken im Hospital muss doppelter Art sein: erstens "hygienisch-diätetisch," und in diesem Sinne ebenso gründlich wie in einem Sanatorium, und zweitens aber auch "moralisch."

4. Es ist daher unerlässlich, den als "heilbar" anerkannten Tuberkulösen die Freude des Lebens und die Hoffnung auf Genesung zu sichern.

5. Eintheilung der in Krankenhäusern aufgenommenen Lungenkranken in drei "Verwaltungsklassen," die ganz abgesondert und ohne täglichen Verkehr mit einander sein müssen: (1) Tuberkulöse im Anfangsstadium (ohne Auswurf); (2) "Offene" Tuberkulöse, die noch als heilbar und für die Sanatoriumsbehandlung passend angesehen werden; (3) "Chronische Phthisiker," die nur noch "Armenpflege" (secours de l'hospice) brauchen.

6. Die Eintheilung der aufgenommenen Tuberkulösen in diese drei Klassen muss so bald wie möglich gemacht werden. Zu diesem Zweck muss jeder auf Lungentuberkulose verdächtige Kranke sofort nach seiner Aufnahme ins Hospital in ein abgesondertes Zimmer gebracht werden und darin verbleiben bis die Diagnose sichergestellt ist.

The Isolation of Poor Consumptives in General Hospitals.—(LETULLE.)

1. Cases of "open tuberculosis," admitted to hospitals for general diseases, must be isolated.

2. The "measures of collective preservation" must be carried out in such a manner as not to injure the poor consumptives who intrust their health to our keeping.

3. The treatment of tuberculous patients in a hospital must be not only "hygienic and dietetic," and as completely so as in a sanatorium, but also moral.

4. It is, therefore, absolutely necessary in curable cases to secure to the consumptive the joy of living and the hope of recovery.

5. Consumptives admitted to general hospitals must be divided into three distinct "administrative classes," without daily communication, so as to secure complete isolation: (1) Early cases (without expectoration); (2) open cases considered curable and suitable for sanatorium

treatment; (3) "chronic consumptives," who merely require humane care and treatment.

6. This division into three classes must be made as early as possible. With that end in view, every patient suspected of pulmonary tuberculosis must be isolated in a separate room immediately after his admission, until the medical diagnosis has been definitely made.

El Aislamiento de los Tisicos Pobres en los Hospitales Generales.— (LETULLE.)

1. Casos de tuberculosis con lesiones abiertas admitidos en los hospitales deberan aislarse.

2. Estas medidas "de preservacion colectiva," deberan hacerse de tal modo que estas no dañen á los pacientes pobres que encomiendan su salud en neustras manos.

3. El tratamiento de los pacientes tuberculosos en los hospitales no deberá ser solamente "higienico y de la dieta" y tan completo como se hace en un sanatorio, sino que tambien al paciente debera darsele un tratamiento "moral."

4. Esto es, por lo tanto, absolutamente necesario en los casos curables de asegurar a los pacientes los placeres de la vida, y la esperanza de la recuperacion.

5. Los consuntos admitidos en los hospitales generales, deberán dividirse en tres "clases administrativas" distintas, sin demora á fin de obtener un aislamiento completo: 1. Casos prematuros (sin expectoracion); 2. casos con lesiones abiertas que se concideran curables que se concideran apropiados para el tratamiento en los sanatorios; 3. "Tisicoscronicos" que solamen requieren buen cuido y tratamiento.

6. La division en estas tres clases debera hacerse tan pronto como sea posible. Con este punto en vista, cada paciente sospechoso de tuberculosis pulmonar debera ser aislado en un cuarto separado inmediatamente despues de su admision, hasta que el diagnostico medico sea hecho definitivamente.

ZEHN JAHRE ERFAHRUNGEN IM HEILSTÄTTEN-WESEN.

Von Prof. Dr. Pannwitz,
Charlottenburg.

Die Tuberkulose ist eine Infektionskrankheit; sie muss also nach den Grundsätzen der Seuchenbekämpfung bekämpft werden. Diese Grundsätze umfassen:

1. die frühzeitige Ermittlung der Krankheitsfälle,
2. die Vernichtung der Krankheitskeime,
3. die zweckmässige Absonderung der Kranken.

Aber bei der Tuberkulose sind die Massnahmen zur Durchführung dieser Grundsätze wesentlich komplizierter, als bei den bekannten akuten Volkskrankheiten, der Cholera, Pest etc. Man muss sich erinnern, dass die Tuberkulose seit Jahrtausenden tief im Volke wurzelt, sehr weit verbreitet ist und im einzelnen Krankheitsfalle sehr lange dauert. Ihr Einfluss auf das sociale Dasein und Leben des Volkes ist deshalb so tiefgehend und weitgreifend, dass sanitätspolizeiliche Zwangsmassregeln nur sehr vorsichtig angewendet werden dürfen. Der Haupterfolg bei der Bekämpfung wird von dem zunehmenden Verständnis und der freiwilligen Mitwirkung einer einsichtigen Bevölkerung erwartet werden müssen.

Es ist verständlich, dass vor der Entdeckung des Tuberkelbacillus die Aussichtslosigkeit des Kampfes gegen die chronische Volksseuche eine allgemeine Gleichgültigkeit des Publikums hervorgerufen hatte. Es ist auch begreiflich, dass die nach der Entdeckung zunächst rein nach der prophylaktischen Seite aufgestellten Abwehrtheorien weder bei Behörden noch bei dem Publikum sogleich die erforderliche Unterstützung fanden.

Ein allgemeiner Volksaufstand gegen die Zwingherrschaft der Tuberkulose konnte vielmehr erst erfolgreich eingeleitet werden, als man durch das neue Dogma: "Die Tuberkulose ist heilbar; sie kann in Sanatorien nach der hygienisch-diätetischen Behandlungsmethode erfolgreich behandelt werden," die Indolenz des Publikums überwinden und neue Hoffnungsfreudigkeit in die Herzen des schwer betroffenen, daniederliegenden Volkes pflanzen konnte.

So sind denn seit mehr als einem Jahrzehnt die Volkssanatorien zu einem wesentlichen Propagandamittel im Kampfe gegen die Tuberkulose geworden. Sie stellen unter den zur Absonderung der Kranken dienenden Anstalts-

Einrichtungen einen integrierenden Bestandteil, einen bestimmten Anstaltstyp dar, der durch andere Einrichtungen nicht ersetzt werden kann. Ueberall da, wo eine ausreichende Zahl solcher Anstalten noch nicht vorhanden ist, macht sich das Bedürfnis nach ihrer Errichtung geltend, und so erscheint es wertvoll und zweckmässig, nunmehr nach einem Zeitraum von mehr als 10 Jahren die hauptsächlichsten Erfahrungen zur Verwertung bei künftigen Neuanlagen zusammenzufassen.

Das hygienisch-diätetische Heilverfahren in Heilstätten beruht auf dem ausgiebigen Genuss der frischen Luft, guter, dem einzelnen Krankheitsfalle angepasster Ernährung, Abhärtung durch regelrechte Hauptpflege, gründliche Erziehung des Kranken zu gesundheitlicher Lebensweise. Bei Bau, Einrichtung und Betrieb von Heilstätten muss in allen Einzelheiten auf diese Grundlinien des Heilverfahrens gerücksichtigt werden. Daraus resultieren naturgemäss spezielle Bedürfnisse und spezielle Ergebnisse.

Im Folgenden sollen die Heilstätten-Erfahrungen besprochen werden, soweit sie allgemeiner und grundlegender Natur sind, und zwar:

1. die Erfahrungen bei Bau und Einrichtung,
2. die Erfahrungen beim Betrieb,
3. die Behandlungs-Ergebnisse,
4. die ergänzenden Massnahmen vor und nach der Heilstätten-Behandlung,
5. die speziellen Erfahrungen in Kinderheilstätten.

1. Erfahrungen bei Bau und Einrichtung von Heilstätten.

Als man in Deutschland, unterstützt durch die reichen Hülfsmittel der Arbeiterversicherung, Mitte der neunziger Jahre des vorigen Jahrhunderts zur Errichtung von Volksheilstätten im grossen Stile schreiten konnte, lagen über den Bau nur die Erfahrungen der Sanatorien für die begüterten Klassen vor. Ihre Grundlagen konnten nicht ohne weiteres auf die Heilstätten für Unbemittelte übernommen werden. Während von schweizerischer Seite versucht worden war, "Normalien" für den Bau von Volks-Sanatorien aufzustellen, sah man in Deutschland von der Aufstellung solcher ab. Im Kaiserlichen Gesundheits-Amt zu Berlin wurden vielmehr von einer Sachverständigen-Kommission "Gesichtspunkte zum Bau einer Volksheilstätte für 100 männliche Lungenkranke" aufgestellt, welche das damals neubegründete Deutsche Central-Komitee für die Bekämpfung der Tuberkulose zur Grundlage seiner Propaganda für den Heilstättenbau machte. Nach diesen Gesichtspunkten, die nachher auch vielfach ausserhalb Deutschlands als Richtschnur gedient haben, sind inzwischen mehr als 100 Volksheilstätten mit je 100 und mehr Betten entstanden.

Die mit dem Bau dieser Anstalten betraut gewesenen Architekten lassen sich in zwei Kategorien teilen, in solche, die für den Heilstättenbau von den

Bedürfnissen einer allgemeinen Krankenanstalt ausgegangen sind, und in solche, die die Erfordernisse eines einfachen, hygienischen Wohnhauses zu Grunde legten. Beide mussten die von ihnen errichteten Gebäude mit den Spezialbedürfnissen des hygienisch-diätetischen Heilverfahrens ausstatten. Die ersteren mussten von den Normen des Krankenhauses manches absetzen, die letzteren zu denjenigen des Wohnhauses manches hinzutun. Heute sind die Anstalten beiderlei Herkunft, da sie seit Jahren nachweislich die gleichen Ergebnisse zeitigen, als gleichwertige Instrumente bei der Tuberkulose-Bekämpfung zu betrachten. Wesentlich verschieden sind aber die Kosten für das einzelne Bett. Bei der einen Bauart kostet es durchschnittlich das doppelte wie bei der anderen.

Bei dieser auffälligen Verschiedenheit in der Auffassung des baulichen Bedürfnisses, die für die Disponierung über die zum Tuberkulosekampf verfügbaren Geldmittel von schwerwiegender Bedeutung ist, hat die Internationale Tuberkulose-Vereinigung eine Spezial-Kommission eingesetzt, welche die Erfahrungen auf diesem Gebiete einer eingehenden Prüfung unterziehen und, wenn möglich, *"hygienische Mindestforderungen für den Bau von Volksheilstätten"* aufstellen soll. Die Kommission hat am 9. Juli des Jahres 1908 sich über die Grundzüge in einer Sitzung in Brüssel geeinigt. Die Internationale Tuberkulose-Konferenz in Philadelphia (September 1908) wird den Bericht dieser Kommission entgegennehmen und beschliessen, was zur Klärung der Frage fernerhin geschehen soll.

Ich persönlich stehe auf folgendem Standpunkt, den ich auf der vorjährigen Wiener Tuberkulose-Konferenz vertreten habe:

Da die Bekämpfung der Tuberkulose seitens der öffentlichen und privaten Wohlfahrtspflege grosse finanzielle Opfer erfordert, so ist bei der Disposition über die verfügbaren Mittel mit besonderer Vorsicht zu verfahren, und für die einzelnen Tuberkulose-Einrichtungen—unbeschadet nationaler oder lokaler Eigenart—ein gewisses Normalmass festzustellen, bei dessen Einhaltung einerseits der volle Zweck erfüllt, anderseits ein Durchschnittsaufwand nicht überschritten wird.

Die Volksheilstätten sind keine allgemeinen Krankenanstalten nach neuzeitlichen Anforderungen, sondern hygienisch angelegte und betriebene Spezialanstalten, in denen der Lungenkranke vor allem auch gesundes Wohnen lernen soll. Bei Volksheilstätten hat deshalb die Projektierung von Bau und Einrichtung normaler Wohnhäuser auszugehen, in deren hygienische Verhältnisse der Kranke nach seiner Entlassung zurückkehrt, nicht von Bau und Einrichtung des modernen Krankenhauses.

Für Volksheilstätten ist Bauprogramm und Mindestmass an hygienischen Anforderungen als feststehend zu betrachten. Die Bauverhältnisse sollen durch zweckmässige Wahl des Bauplatzes möglichst einfach gestaltet werden. Die bauliche und technische Ausführungsweise soll nur klimatischen Rücksichten, nicht subjektiver Geschmacksrichtung unterliegen.

Bei voller Erfüllung des Anstaltszwecks können Heilstätten für durchschnittlich 4000 Mark pro Bett errichtet werden, ein Kostenaufwand, dessen Ueberschreitung in mässigen Grenzen sich nur durch besondere lokale Schwierigkeiten (Grunderwerb, Zufahrtsstrasse, Wasserversorgung, Entwässerung), nicht durch bautechnische Rücksichten oder Privatansichten über Hygiene begründen lässt.

Auf die Einzelheiten der hygienischen Mindestforderungen einzugehen, kann nicht der Zweck dieses Berichtes sein. Richtschnur muss in allen Einzelheiten bei Bau und Einrichtung sein, dass der gesamte Anstaltsapparat die oben genannten speziellen Heilfaktoren in bestmöglicher Weise zur Verwertung gelangen lässt.

Im Uebrigen sei hervorgehoben, dass bei Bau und Einrichtung bei aller möglichen Einfachheit und Sparsamkeit doch einem für das Heilverfahren unerlässlichen Krankenkomfort Rechnung zu tragen ist. Da die Kranken der grossen Mehrzahl nach der Klasse der Leichtkranken angehören und den Tag in der Regel ausserhalb der Schlafräume, auf Spaziergängen, in Liegehallen, bei den Mahlzeiten etc. verbringen, so sind eigentliche Wohnräume nicht erforderlich, sondern für den Aufenthalt bei ungünstiger Witterung einige geeignete Tageräume vorzusehen. Der Bauplatz soll frei von Staub und Rauchbelästigung, gegen herrschende Winde geschützt und möglichst ausgiebiger Besonnung ausgesetzt sein. In der Nähe soll sich reichliche, nicht zu dichte Waldung, am besten gemischter Holzbestand mit vielem Nadelholz, befinden. Leichte Zugänglichkeit, guter Baugrund, gutes, reichliches Trinkwasser, einwandfreie Beseitigung der Abfallstoffe sind selbstverständliche Erfordernisse. Man wird solche Plätze, die zugleich erwünschte landschaftliche Reize bieten, eher im gebirgigen Terrain als in der Ebene finden, und man wird, wo Plätze im Gebirge ohne wesentliche Mehrkosten zur Verfügung stehen, diesen vor solchen in der Ebene den Vorzug geben. Die Erfahrung lehrt aber, dass der Erfolg durch eine mässige Höhenlage, wie sie in den meisten Kulturländern erreichbar ist, nicht wesentlich verbessert werden kann. Bringen es deshalb die speziellen Bedürfnisse des Bevölkerungsteiles, für welchen ein Volkssanatorium erbaut werden soll, mit sich, so kann die Anstalt ohne Nachteil an jedem hygienisch einwandsfreien Platze auch in der Ebene errichtet werden.

Dass im übrigen alle gesundheits-technischen Fortschritte bei Bau und Einrichtung Berücksichtigung finden müssen, braucht nicht besonders hervorgehoben zu werden. Dies bezieht sich insbesondere auf die Staubfreiheit und Desinfizierbarkeit der Räume. Fussböden, Wände und Decken sollen gut zu reinigen und zu desinfizieren, dicht, ohne Fugen, von glatter Oberfläche sein, und ausgerundete Ecken, sowie keine unnötigen Vorsprünge haben. Der Fussbodenbelag soll undurchlässig, auf feuchtem Wege desinfizierbar, und tunlichst warm sein. Am besten hat sich hier Linoleum

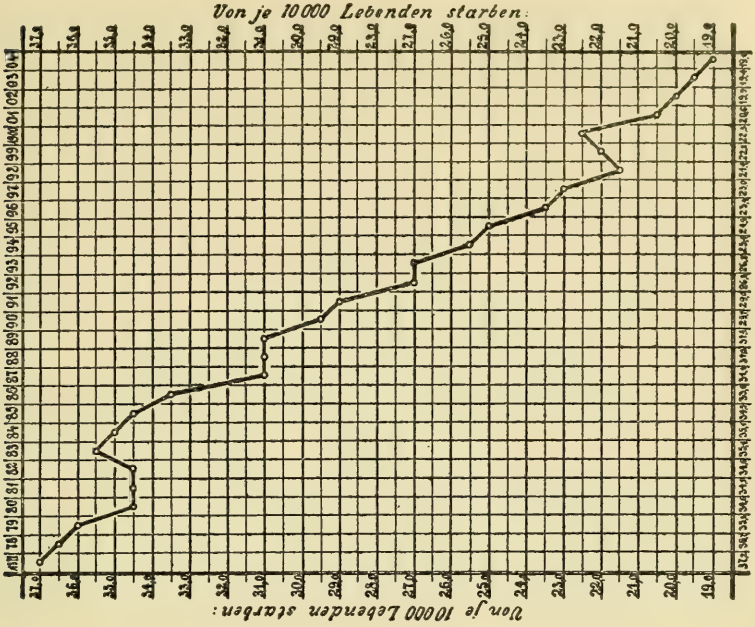
bewährt. Der Anstrich der Wände ist bis zur Höhe von 1.70 m. in abwaschbarer Farbe herzustellen. Die Fenster sollen eine möglichst grosse Lichtfläche und obere Kippflügel haben. Leichte, waschbare Vorhänge zur zweckmässigen Abhaltung übermässigen Sonnenlichtes sind zulässig.

Hinsichtlich der Heizung, Beleuchtung, Wasserversorgung und Beseitigung der Abgänge gelten die allgemeinen hygienischen Grundsätze.

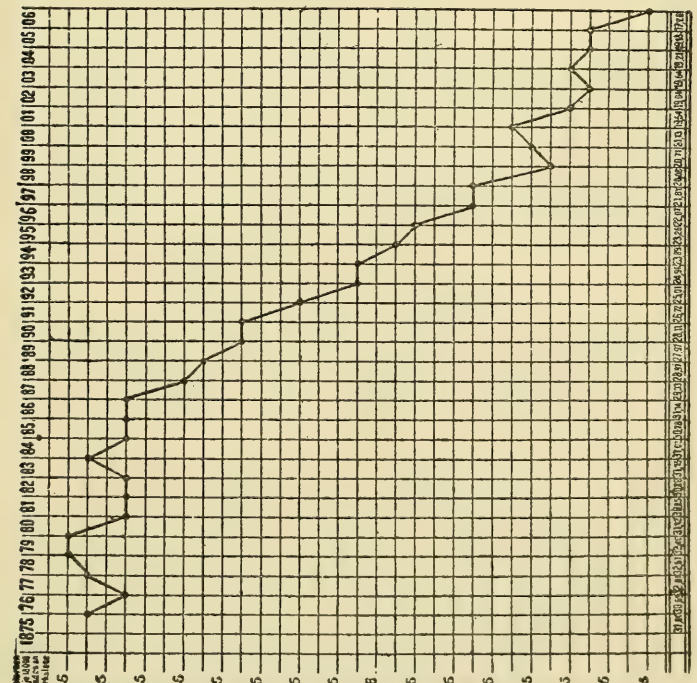
In dem Bestreben, dem Kranken während der 24 Stunden des Tages möglichst dauernd reine Luft zuzuführen, hat sich, neben dem Aufenthalt in gut ventilierten Räumen und in freier Luft auf zweckmässigen Spaziergängen, insbesondere die von Dettweiler ausgebildete Liegekur als bewährtes Heilmittel erwiesen. Durch sie wird ermöglicht, dass die Kranken mehrere Stunden des Tages, bei kalter Witterung durch zweckentsprechende warme Hüllen vor Abkühlung geschützt, im Freien ruhend zubringen. Hierfür ist für jeden Kranken ein Liegeplatz erforderlich, die meist zu mehreren in besonderen Liegehallen vereinigt sind. Derartige Liegehallen bilden ein besonderes bauliches Bedürfnis der Volkssanatorien. Es sind dies grössere oder kleinere, möglichst nach Süden offene, sonnige, mit Schutzvorrichtung gegen Wind, Regen und Sonne gut versehene Räume, in denen Liegesessel Platz finden. Es ist zweckmässig, eine Anzahl der Liegeplätze direkt mit den Schlafräumen zu verbinden, um bettlägerigen Kranken ebenfalls die regelrechte Liegekur im Freien verordnen zu können. Die Mehrzahl der Liegeplätze kann jedoch, namentlich zur Ersparung von Kosten, in der Nähe der Heilstättengebäude in einfachen Schutzhallen untergebracht werden.

Von den bei der Liegekur benutzten Liegesesseln gibt es eine grosse Zahl von Modellen. Die meisten davon erfüllen ihren Zweck, wenn sie unter ärztlicher Kontrolle richtig benutzt werden, d. h. wenn der Kranke die Liegezeit in einer seinem Zustand förderlichen Lage darauf verbringen kann. Dazu müssen die Liegesessel so dem Licht ausgesetzt werden, dass der Kranke ohne schädliche Verdrehungen des Körpers sich beschäftigen und namentlich lesen kann. Wie bei allen Einzelheiten der Heilstättenkur, so ist auch hier die ärztliche Kontrolle und Erziehung Vorbedingung.

Der Raumbedarf in den Schlafräumen der Volkssanatorien kann geringer bemessen werden als in Krankenhäusern. Da die Fenster auch während der Nacht wenigstens zum Teil geöffnet bleiben, so ist die erforderliche Lufterneuerung in jedem Falle garantiert. In deutschen Heilstätten sind 30 cbm. als Mindestluftraum zu Grunde gelegt. Die Zimmer für die Kranken sind grundsätzlich nur als Schlafräume anzusehen. Der Kranke soll, wie oben erwähnt, die 24 Stunden des Tages für den Genuss der frischen Luft verwenden. Er soll sie dementsprechend im Freien, auf Spaziergängen oder bei der Liegekur zubringen, so dass von den Aufenthaltsstunden im Freien höchstens die Zeit für die Mahlzeiten im gut ventilierten Speisesaal



Sterblichkeit an Lungenschwindsucht in den deutschen Orten mit 15,000 und mehr Einwohnern.



Die Sterblichkeit an Tuberkulose in Preussen von 1875 bis 1906 berechnet auf 10,000 Lebende.

und die Schlafenszeit während der Nacht in Abzug zu bringen ist. Für den Aufenthalt bei ganz ungünstigem Wetter dienen besondere Tagesräume. Hiernach sind eigentliche Wohnräume überhaupt nicht vorhanden.

Ob es erstrebenswert ist, wenn es auf die Kosten nicht ankommt, nur Einzelzimmer einzurichten, muss dahingestellt sein. Zweifellos kommt alsdann der wichtige Gesichtspunkt der gegenseitigen Erziehung der Kranken nicht voll zur Geltung. Natürlich müssen auch in Volksheilstätten mit grösseren Schlafräumen eine Anzahl, vielleicht 10% aller Räume, als Einzelzimmer vorgesehen werden. Es gibt unter den Kranken immer einige, die aus irgend welchen Gründen allein untergebracht sein wollen oder müssen, und es erleichtert dem Chefarzt die Gruppierung seiner Kranken, wenn er Zimmer verschiedener Grösse zu seiner Disposition hat. Vom Standpunkt der Erziehung zur körperlichen Reinlichkeit hat man sich meist für die Anlage besonderer Waschräume entschlossen, wenigstens soweit diese Anstalten für Männer bestimmt. Bei Frauen gebietet es die Rücksicht auf die Schamhaftigkeit, nicht allein möglichst viel kleinere Zimmer vorzusehen, sondern auch die Waschgelegenheiten in den Schlafräumen selbst zu belassen.

Dass Untersuchungszimmer und Laboratorium bestimmte Anforderungen hinsichtlich der Lage, Grösse, Belichtung und Ausstattung haben müssen, darf als selbstverständlich gelten.

Schliesslich hat es sich als zweckmässig erwiesen, für die beiden Geschlechter getrennte Heilstätten zu errichten, weil die Vereinigung beider in ein und derselben Anstalt zu allerlei die Anstaltsordnung und den Heilerfolg gefährdenden Unzuträglichkeiten führen kann. Wo Männer und Frauen gleichzeitig aufgenommen werden müssen, können etwaige Schwierigkeiten auf ein geringes Mass herabgesetzt werden, wenn eine Trennung der Geschlechter nach Zeit und Ort durch den Betrieb gewährleistet wird.

2. Erfahrungen beim Betrieb.

In die Heilstätten werden bisher der Mehrzahl nach Frühfälle aufgenommen. Es ist also eine Grundlage für die Beurteilung des Krankheitsgrades und die Gruppierung der Kranken nach dem Stadium der Erkrankung erforderlich.

Hinsichtlich der *Stadieneinteilung* haben sich in den letzten 10 Jahren wesentliche Aenderungen vollzogen. Die bekannte Turban'sche Einteilung in I., II., III. Stadium hatte sich für Privatsanatorien im allgemeinen bewährt. Dadurch aber, dass namentlich in Deutschland alljährlich viele Tausende von Kranken auf Grund der Arbeiter-Versicherung den Volkssanatorien überwiesen wurden, und dass das Kaiserliche Gesundheits-Amt in Berlin diesem grossen Material eine einheitliche statistische Grundlage sichern musste, kamen neue Gesichtspunkte in die Gruppierung der Kranken

hinein. Auf Grund der Vorschläge des Kaiserlichen Gesundheits-Amts in Berlin und der Verhandlungen der Internationalen Vereinigung, die sich in ihren Konferenzen jahrelang mit diesem Gegenstand eingehend beschäftigte, ist von der Tuberkulose-Konferenz in Wien 1907 nunmehr unter der Bezeichnung Turban-Gerhardt'sche Stadien-Einteilung das folgende Schema allgemein angenommen worden:

Stadium I. Leichte, auf kleine Bezirke eines Lappens beschränkte Erkrankung, die z. B. an den Lungenspitzen bei Doppelseitigkeit des Falles nicht über die Schulterblattgräte und das Schlüsselbein, bei Einseitigkeit vorn nicht über die zweite Rippe hinunterreichen darf.

Stadium II. Leichte, weiter als I, aber höchstens auf das Volumen eines Lappens, oder schwere, höchstens auf das Volumen eines halben Lappens ausgedehnte Erkrankung.

Stadium III. Alle über II hinausgehenden Erkrankungen und alle mit erheblicher Höhlenbildung.

Für die dringend erforderliche Vereinheitlichung der Tuberkulose-Statistik ist es Vorbedingung, dass alle Sanatorien ihre Kranken nach dieser Internationalen Stadien-Einteilung beurteilen. Ich darf deshalb die Bitte, dass dies überall geschehen möge, auch an dieser Stelle aussprechen. Dass im übrigen mit der erfolgten Einigung über die Stadien-Einteilung noch nicht alle Wünsche befriedigt sind, zeigt die nachstehende Aeusserung des ärztlichen Leiters von Hohenhonnef:

"Es scheint mir," schreibt *Meissen*, "rein wissenschaftlich, aber auch für praktische Zwecke wichtig, dass wir zu einer klaren Stadien-Einteilung der Lungentuberkulose gelangen, die möglichst allgemein angenommen wird. Die Wiener Stadien-Einteilung ist an sich ganz gut, aber sie berücksichtigt nur die quantitativen, nicht die qualitativen Verhältnisse der Erkrankung. Ich schlage deshalb vor, dass man der Stadien-Bezeichnung regelmässig hinzufügen möge, ob es sich um offene oder geschlossene Tuberkulose, und ob es sich um eine fieberhafte oder fieberlose Form handelt. Der praktische Wert einer solchen Teilung liegt darin, dass man allmählich zu einer vernünftigen Auswahl der für die Heilstätten geeigneten Fälle gelangen würde. Geschlossene und namentlich ohne Fieber verlaufende Tuberkulosen eignen sich offenbar auch im II. und selbst im III. Stadium für die Heilstättenkur."

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Von weittragender Bedeutung bei der Behandlung in Volkssanatorien ist die Erfahrung, dass eine *Zweiteilung der Kur, in Ruhekur und Beschäftigungskur*, sich als notwendig erweist. Der mehrmonatige Aufenthalt in der Heilstätte mit ausgedehnter, durch die Liegekur gesicherter Ruhe des Körpers verursacht meist eine Zunahme des Körpergewichtes, namentlich bei Personen aus den Arbeiterkreisen, welche vielfach aus unzulänglichen

Ernährungsverhältnissen in die gute Verpflegung der Anstalt eintreten. Diese Vermehrung des Körpergewichtes darf als Ausdruck einer Besserung des körperlichen Allgemeinzustandes, aber doch nur als Beginn einer solchen angesehen werden. Wenn es nicht gelingt, das Gewonnene zum Teil zur Kräftigung der Muskelsubstanz zu assimilieren, so muss das während der Ruhekur angesetzte Material ganz oder doch zum wesentlichen Teile in kurzer Zeit wieder verschwinden, sobald der Ruhe und guten Verpflegung ohne Uebergang alsbald harte Arbeit mit Muskelanstrengung bei weniger guter Ernährung folgt. Hierzu kann nur systematische, körperliche Beschäftigung während oder nach der Sanatorienkur dienen.

Beschäftigungen im gewerblichen Berufsleben können hierbei kaum in Frage kommen, da man diese Berufe mehr oder weniger in geschlossenen Räumen ausüben muss. Wenn man damit zusammenhält, dass das Verfahren der hygienisch-diätetischen Behandlung in der Hauptsache auf sehr ausgiebigem Genuss der frischen Luft beruht, so kommt man unschwer dazu, eine Gewöhnung der genesenden Patienten an landwirtschaftliche und gärtnerische Berufe ins Auge zu fassen. Solche ländlichen Heilbetriebe müssen am besten von den eigentlichen Heilstätten getrennt sein, aber damit in direkter Verbindung, im übrigen natürlich unter steter ärztlicher Kontrolle stehen.

Viele Sanatoriumsärzte haben von vornherein regelrechte körperliche Arbeit als Heilfaktor betrachtet. Auch hat man die körperliche Beschäftigung aus dem Gesichtspunkte für erforderlich erachtet, dass der an feste Tageseinteilung gewöhnte Kranke, um nicht in Langeweile zu verfallen und womöglich die Anstaltsdisziplin zu gefährden, schon des Zeitvertreibs wegen beschäftigt werden müsse. Die Erfahrungen in dieser Richtung sind indes verschiedenartig. Während in manchen Volkssanatorien seit Jahren systematisch gearbeitet wird, sind in anderen die Patienten nicht dazu zu bewegen gewesen. Es liegt dies vielfach an irrigen, nicht selten politischen Sonderansichten über Arbeitsrecht und Arbeitspflicht. Jedenfalls hindern derartige Widerstände nicht die allmähliche positive Entwicklung einer im Wesen der Dinge begründeten Neuerung. Im Folgenden seien hierzu einige Aeusserungen von Chefärzten angeführt, die seit zehn Jahren auf diesem Gebiet Erfahrungen haben.

H. Schulze (Hohwald Sachsen) schreibt:

"Die Beschäftigung der Patienten mit körperlicher Arbeit in der Heilstätte, und zwar in dem letzten Viertel bis Drittel der Kur, halte ich nicht nur für ein wünschenswertes, sondern für ein notwendiges Heilmittel. Der Heilstättenarzt darf sich jedoch nicht mit der blossen Verordnung dieses Heilmittels begnügen. Vielmehr ist es durchaus notwendig, die Anwendung des Mittels dauernd und aufmerksam zu überwachen. Der Arzt soll mit der Art der verordneten Arbeiten so weit vertraut sein,

dass er sie im gegebenen Falle praktisch vorführen und dabei den Patienten lehren kann, wie er schlechte Körperhaltung, falsche Atmung, unnötige Kraftverschwendung u. s. w. vermeidet. Den Patienten für die Leistung solcher körperlichen Arbeit zu bezahlen, halte ich für verfehlt; man gibt dem Patienten doch auch sonst keine Belohnung dafür, dass er ein vom Arzt verordnetes Heilmittel anwendet. Der Nutzen, der etwa der Heilstätte aus körperlicher Arbeit erwächst, steht erst in zweiter Linie gegenüber dem Vorteil, den der Patient selbst von der Arbeit hat!"

Ferner äussert sich *Gebser*, (Carolagrün):

"Die Beschäftigung der Lungenkranken während der Heilstättenkur ist nützlich: für die Kranken selbst, weil sie die Langeweile vertreiben hilft, dem Kranken das Vertrauen in die wiederkehrende Arbeitsfähigkeit verschafft, den Kranken ganz allmählich wieder an Arbeit gewöhnt, anregend auf den Stoffwechsel wirkt und so direkt den Kurerfolg entschieden günstig beeinflusst; für die Heilstätte selbst, weil sie wirtschaftliche Ersparnisse machen hilft (bes. in Männerheilstätten). Die Beschäftigung ist überall durchführbar, wenn sie von dem Chefarzt, der das Vertrauen der Kranken besitzt, den Kranken als Kurmassregel plausibel gemacht wird. Eben weil sie eine nützliche Kurmassregel ist, sollte sie möglichst in allen Heilstätten durchgeführt werden und sollte auch keine Bezahlung für sie geleistet werden."

Koppert (Sophienheilstätte Weimar) fasst seine Ansicht wie folgt zusammen:

"Eine wichtige Frage im Heilstättenwesen erscheint mir die des Ausbaus der Heilstättenbehandlung im Sinne der 'Zweiteilung der Kur.' Der bis jetzt leider noch ziemlich allgemein übliche Uebergang der Pfleglinge aus dem Heilstättenleben in den rauhen Kampf ums Dasein ist zu schroff. Es ist geradezu widersinnig, Kranke, welche mehrere Monate und länger völlig untätig gewesen sind, unvermittelt mit dem Tag der Entlassung wieder in das Erwerbsleben mit 10–12stündiger täglicher Arbeitszeit zurückzuführen. Unter den Bestrebungen, welche diesem Uebelstand bei der Heilstättenbehandlung abzuhelfen vermögen, betrachte ich als die vorteilhaftesten die 'Zweiteilung der Kur' durch Angliederung einer Art 'ländlichen Kolonie' in der Art und Form, wie es in den Geschäftsberichten des Deutschen Zentral-Komitees zur Bekämpfung der Tuberkulose von Prof. Pannwitz festgelegt worden ist."

Freund (Berlin) weist ebenfalls auf Grund seiner kombinierten Erfahrungen als Vorsitzender der Landes-Versicherungs-Anstalt Berlin und als Vorsitzender des Verbandes Deutscher Arbeitsnachweise auf die Bedeutung derartiger Einrichtungen mit folgenden Worten hin: "Eine völlige Gesundung würde meist eintreten können, wenn diese Personen nach beendeter Kur für immer oder für eine Reihe von Jahren ihre bisherige städtische Arbeit, die öfters den Keim zu den Leiden gelegt hat, verliessen und eine

andere Erwerbstätigkeit unter günstigen hygienischen Arbeitsverhältnissen annehmen würden. Hier kommt die ländliche Arbeit in erster Linie in Betracht, und es würde sich fragen, ob nicht diese Arbeiter zur ländlichen Arbeit übergeführt werden könnten. Eine unmittelbare Verpflanzung auf das Land ist natürlich undurchführbar. Es müsste eine Zwischenstation geschaffen werden, auf welcher der städtische Arbeiter zur ländlichen Arbeit vorgebildet wird. Diese Zwischenstation wird am besten in Verbindung mit der Heilstätte angelegt werden können, so dass die Pfleglinge auch in dieser Zeit unter einer gewissen ärztlichen Kontrolle stehen. Da die Heilstätte selbst für ihren Betrieb einen grossen Bedarf an landwirtschaftlichen Produkten hat (insbesondere Kartoffeln, Gemüse, Obst, Milch, Eier, Butter u. s. w.), so kann diese Station den Zwecken der Heilstätte unmittelbar dienstbar gemacht werden."

Es fehlt natürlich nicht an Einwänden gegen die Errichtung solcher besonderen Heilbetriebe für Landwirtschaft (ländliche Kolonien für Lungenkranke). Die hauptsächlichsten sind folgende:

1. Die Industriearbeiter haben sich bei allen ähnlichen Versuchen als ausserordentlich unbeholfen für ländliche Arbeiten erwiesen. Wenn in Zeiten der Leutenot, z. B. in der Ernte, Arbeiter auf das Land gezogen werden, so sind die darunter befindlichen gewerblichen Arbeiter im landwirtschaftlichen Betriebe vielfach unbeholfener als analog die ungelernten Arbeiter in der Industrie. Dies betrifft besonders das Umgehen mit Tieren, aber auch im Grunde die meisten anderen landwirtschaftlichen Tätigkeiten. Man sagt, schon deshalb würden Industriearbeiter selbst bei ursprünglich gutem Willen bald wieder aus der Kolonie herausdrängen, zumal ihnen in ihrem alten Beruf ein ungleich höherer Wochenlohn winkt.

2. Die Sorge um die Familie, welche schon jetzt die mehrmonatliche Kurdauer vielfach beeinträchtigt, wird bei noch längerer Abwesenheit des Ernährers den Entschluss des Kranken, in der Behandlung zu bleiben, erst recht bald wanken machen. Es kommt hinzu, dass die jetzt von den Kranken-Kassen und Versicherungs-Anstalten gewährte Familienunterstützung vielleicht auf das doppelte und mehr ausgedehnt werden müsste.

3. Die Befürchtung endlich, dass bei Zweiteilung der Behandlung in Ruhe- und Beschäftigungskur die mühsam beseitigte Abneigung gegen die Anstaltsbehandlung wieder zunehmen würde. Ob diese Befürchtungen zutreffen, ob sie nicht vielmehr durch die praktische Entwicklung der Sache illusorisch werden, muss die weitere Erfahrung lehren. Wir werden beim Kapitel Kinderheilstätten auf den Gegenstand nochmals zurückkommen.

Die Wichtigkeit der "Zweiteilung der Kur" für das Sanatorienwesen leuchtet ohne weiteres ein. Die Frage, ob man für alle Frühfälle die immerhin kostspieligen Sanatorienplätze beschaffen muss, ob man die Heil-

stätten für schwerere Fälle reservieren und die Frühfälle in Erholungsstätten behandeln soll, würde durch eine Verkürzung der Ruhekur wesentlich beeinflusst werden. Denn wenn die Ruhekur mit rein ärztlicher Behandlung durchschnittlich nur etwa zwei Monate dauert, so würde ein grosser Teil der Heilstättenplätze durch baldige Ueberführung Genesender in die Heilbetriebe für neue Patienten verfügbar. Die Heilbetriebe als Dependancen der Volkssanatorien wirtschaften ferner in demselben Sinne billiger wie die Rekonvaleszentenhäuser als Filialen der Krankenhäuser.

In weiterer Folge wäre zu erwarten, dass Geheilte und Gebesserte, denen die Lust an ländlicher Beschäftigung wieder erweckt ist, zu dauerndem Verbleib auf dem Lande angeregt werden.

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Was die *ärztliche Behandlung in den Volkssanatorien* betrifft, so versteht es sich von selbst, dass neben der hygienisch-diätetischen Behandlungsmethode, wie sie schon oben detailliert wurde, alle wirklichen Fortschritte der Heilkunde Anwendung finden. Leider sind die vielfach im letzten Jahrzehnt aufgetauchten Heilmittel, denen eine besondere Wirkung auf Tuberkulose zugeschrieben wurde, bei näherer Prüfung ohne nachweislichen Erfolg gewesen. Das einzige Mittel, welches die Behandlungsergebnisse tatsächlich zu verbessern scheint und deshalb immer mehr wieder zur Anwendung kommt, ist das *Tuberkulin* und zwar das Koch'sche Alttuberkulin.

Mehrere Sachverständige, welchen in dieser Beziehung besondere Erfahrungen zu Gebote stehen, äussern sich zu dieser Frage wie folgt:

"Die Tuberkulin-Behandlung," schreibt *Petruschky* (Danzig), "hat sich in der grossen Mehrzahl der deutschen Heilstätten als willkommene Ergänzung des Kurplanes eingebürgert. Auch zur Nachprüfung und Nachbehandlung aus Heilstätten Entlassener wird die 'specifische' Methode mit Tuberkulin-Präparaten in steigendem Masse verwendet. Schliesslich hat sich zur Sicherung der Frühdiagnose und zur Kontrolle der Heilung das Alttuberkulin Kochs mehr und mehr als unentbehrlich erwiesen. Neben der Koch'schen Prüfungsmethode bürgert sich neuerdings auch die Pirquet'sche Kutan-Reaktion ein, während die von Wolff-Eisner-Calmette angegebene Ophthalmo-Reaktion von mehreren Autoren als gefährlich verworfen wird."

Weiter schreibt *Kremser* (Sülzhayn):

"Ueber den hohen diagnostischen Wert des Tuberkulins herrscht wohl heute in allen Fachkreisen kaum mehr ein Zweifel. Was den therapeutischen Wert der Koch'schen Tuberkulinpräparate anlangt, so habe ich denselben sowohl bei Alttuberkulin, wie beim Neutuberkulin bei einem nunmehr zwanzigjährigen Gebrauche und einem nach mehreren Tausenden zählenden Krankenmaterial so sehr schätzen gelernt, dass ich diese specifischen Mittel

neben der klimatisch-hygienisch-diätetischen Behandlung nur auf das wärmste empfehlen kann. Im allgemeinen ziehe ich, mit sehr kleinen Dosen (0.0025 mgm.) beginnend, stets langsam und vorsichtig steigend, das Alttuberkulin vor, und zwar in allen fieberlosen Fällen, während ich die Koch'sche Emulsion (T. R.) bei leichtfieberhaften, nicht schwerer erkrankten Fällen mit sehr gutem Nutzen verwendet habe. Eine von mir zusammengestellte Statistik über 600 mit Tuberkulin (Alttuberkulin) behandelte Erkrankungen ergaben, im Vergleich zu den nur nach der klimatisch-hygienisch-diätetischen Methode behandelten Fällen, den ganz besonderen Vorteil der kombinierten Behandlungsweise mit Tuberkulinpräparaten, und zwar keinesfalls etwa nur allein für die prognostisch besonders günstigen Erkrankungen des I. Stadiums, sondern in ganz besonderer Weise gerade des II. Stadiums. Ja selbst einige Kranke im III. Stadium mit relativ gutem Kräftezustand wurden im direkten Anschluss an die eingeleitete Tuberkulinkur noch auffallend gebessert, ja teilweise das Leiden sogar noch zum Stillstand gebracht. Irgendwelche Schädigungen der Patienten habe ich weder bei den notwendig grösseren diagnostischen Dosen, noch viel weniger bei den kleinen therapeutischen Mengen erlebt."

Goetsch (Hohenlychen) fügt betreffs seiner Erfahrungen in den Kinderheilstätten hinzu:

"Das Alttuberkulin Koch in streng individueller, vorsichtig steigend einschleichender, d. h. jegliche Allgemein- und heftige Lokalreaktion vermeidender Anwendung ist besonders im Verein mit der hygienisch-diätetischen Heilstättenbehandlung bei lungentuberkulösen Kindern als ein spezifisches Heilmittel anzusehen. Auszuschliessen sind, abgesehen von akuten Krankheiten: Schwere Herzfehler, Gelenkrheumatismen, Nierenerkrankungen nicht spezifischer Art, Epilepsie, hektisch Fiebernde oder Kranke mit grösseren Einschmelzungen der Lunge (Mischinfektionen); dagegen bilden bis ca. 38°, nur mit geringen, 1° nicht überschreitenden Remissionen Fiebernde, kachektische, sowie Kranke, welche zu Hämoptoë neigen, nur Kontraindikation für die subkutane (intramuskuläre) Tuberkulin-Diagnose. In vielen Fällen hat Tuberkulin eine bleibende, temperaturerniedrigende Wirkung. Als Anfangsdosis empfehle ich bei Kindern $\frac{1}{100}$–$\frac{1}{200}$ mg.; die Steigerungen sollen besonders in höheren Dosen zweckmässig die vorhergehende Dosis nicht über 50% übertreffen. Als Behandlungsdauer halte ich 5 bis 6 Monate für erforderlich; in den letzten 2 Monaten braucht evt. nur ambulante Behandlung speziallistischerseits zu erfolgen. Nur ausnahmsweise dürfte wohl dann eine zweite Heilstättenkur notwendig sein. Auf Grund meiner Erfahrungen, welche auf 9000 Injektionen bei 245 Fällen beruhen, kann ich unter Berücksichtigung obiger Momente das Alttuberkulin Koch vor, während und nach der Heilstättenbehandlung nur warm empfehlen.

Roepke (Melsungen) fasst seine Erfahrungen in folgenden Sätzen zusammen:

"1. Für die Frühdiagnose der Tuberkulose ist die spezifische Diagnostik unentbehrlich. Sie bedient sich ausschliesslich des Alt-Tuberkulins Koch und ermöglicht in etwa 80% der physikalisch, klinisch und bakteriologisch zweifelhaften Fälle die sichere Diagnosenstellung.

"2. Die diagnostischen Tuberkulinproben—die kutane nach v. Pirquet, die perkutane nach Moro, die konjunktivale nach Calmette und Wolff-Eisner, die subkutane nach Robert Koch—bieten Vorteile und Nachteile, die ein individualisierendes Vorgehen notwendig machen.

"3. Die einzelnen Methoden lassen sich kurz dahin präzisieren: Die Pirquet'sche Kutanimpfung ist die Tuberkulinprobe des Säuglings- und Kindesalters. Die Moro'sche Salbeneinreibung ist unzuverlässig und entbehrlich. Die Konjunktivalreaktion ist wegen ihrer Gefährlichkeit bie allen Lungenerkrankungen, bei Skrofulose, sowie bei Säuglingen und kleineren Kindern überhaupt kontraindiziert, während sie bei den initialen Tuberkuloseformen Erwachsener höchstens in 50% aller Fälle brauchbare Ergebnisse liefert. Die Kochs'che subkutane Methode ist wegen der Allgemeinreaktion mit vorübergehenden Störungen verknüpft, steht aber hinsichtlich der diagnostischen Sicherheit an erster Stelle.

"4. In prognostischer Hinsicht leisten alle Methoden gleich wenig.

"5. Alle Methoden lassen Schädigungen der Kranken bei richtiger Auswahl der Fälle und gewissenhafter Methodik sicher vermeiden.

"6. Die Heilstätten, die ausser den Initialfällen der Lungentuberkulose auch die zweiten und selbst prognostisch nicht ganz ungünstigen dritten Stadien mit Erfolg behandeln wollen, müssen den hygienisch-diätetischen Heilplan ausbauen durch die spezifische Therapie.

"7. Zu den spezifischen Mitteln gehören in erster Linie die Tuberkuline, unter denen den Koch'schen Präparaten als den am meisten erprobten und bewährten der Vorzug gebührt. Im übrigen kommt es weniger auf die Wahl des Präparates als auf die Art der Behandlung an.

"8. Das Charakteristikum der modernen Tuberkulinbehandlung ist die milde, einschleichende, möglichst reaktionslose Injektionsmethode. Dass dabei Schädigungen des Kranken ausgeschlossen sind, ist heute allgemein anerkannt. Der Prozentsatz der die spezifische Therapie zum Heilplan heranziehenden Heilstätten ist in den Jahren 1905–1907 von 29% auf 57% angestiegen. Im Jahre 1905 brachten von 121 Volks- und Privatheilstätten 36 Tuberkulin zur Anwendung, im Jahre 1907 von 135 Heilstätten 77. Auch in Kliniken, Krankenhäusern und in der Privatpraxis finden die Tuberkulinpräparate als Hilfs- und Unterstützungsmittel der sonstigen therapeutischen Massnahmen fortgesetzt steigende Beachtung und Verwendung.

"9. Der Wert der Tuberkulinbehandlung kommt zunächst dadurch zum Ausdruck, dass die mit Tuberkulin behandelten Lungenkranken die Tuberkelbacillen im Auswurf bezw. das Sputum überhaupt häufiger verlieren als die nicht spezifisch Behandelten. Vergleichende Feststellungen über die Dauererfolge liegen in beweiskräftiger Anzahl noch nicht vor.

"10. Die Erfolge der spezifischen Therapie bei Lungentuberkulose haben das Anwendungsgebiet der Tuberkuline und sonstigen spezifisch wirkenden Präparate auch auf die anderen tuberkulösen Organerkrankungen ausgedehnt. Und heute hat sich die Tuberkulinkur bereits fest eingebürgert in der Behandlung der Kehlkopf-, Augen-, Haut-, Drüsen- und Magentuberkulose.

"11. Alles in allem ist man berechtigt, von einer neuen Tuberkulinära zu sprechen, die in diagnostischer Hinsicht im Verein mit den klinischen Untersuchungsmethoden und in therapeutischer Hinsicht im Verein mit der hygienisch-diätetischen Allgemeinbehandlung die Bekämpfung der Tuberkulose als Volkskrankheit in die aussichtvollsten Bahnen leitet."

Von sonstigen ärztlichen Hülfsmitteln bei der Behandlung seien noch die Lungen-Saugmaske und die erweiterte Anwendung von Luft- und Sonnenbädern erwähnt. Ueber erstere schreibt *Kuhn* (Berlin) folgendes:

"Die Lungen-Saugmaske stellt für die gesamte Lunge diejenigen Bedingungen her, durch welche normaler Weise die unteren Lungenteile gegenüber den oberen gegen Tuberkulose verhältnismässig geschützt sind. Die Lungen-Saugmaske bewirkt durch erschwerte Inspiration bei freier Expiration eine passive Hyperämie unter gleichzeitiger Beförderung des Lymphstromes der Lungen und wirkt ausserdem durch Ruhigstellung der Lungen, Ausbildung der Atemmuskulatur, allmähliche Weitung des Brustkorbes (ohne akute Lungendehnung), Vermehrung der Blutelemente wie in Höhenklima u. a. m. Die Widerstandsatmung durch die Saugmaske stellt auf unblutigem Wege die von Freund-Hart erstrebte Weitung der oberen Brustkorbteile her und ist zugleich als eine unschädliche und rationelle 'Atmungsgymnastik' eine notwendige Ergänzung des hygienisch-diätetischen Verfahrens."

Zur Frage der Hautpflege und Abhärtung schreibt *Liebe* (Waldhof-Elgershausen):

"Luftbäder sind noch besser als die in jedem Falle in Lungenheilstätten dringend erforderliche Wasserbehandlung geeignet, die Patienten abzuhärten, ohne sie der Gefahr der Erkältung auszusetzen. Denn es ist durch die nunmehr aus allen Klimaten und Jahreszeiten vorliegenden Erfahrungen bewiesen, dass selbst zarte und empfindliche Personen, die oft kaltes Wasser nicht oder schlecht vertragen, Luftbäder ohne Schaden nehmen und den gewünschten Erfolg haben können. Deshalb sollte das Luftbad in keiner modernen Lungenheilstätte fehlen. Ueber Sonnenbäder bei Lungen-

kranken liegen noch zu wenig Erfahrungen vor; doch berechtigen die bisherigen Versuche nicht zu allzugrossen Bedenken, sondern zur Fortsetzung, allerdings unter Anwendung der grössten Vorsicht."

Die wichtigste ökonomische Frage ist, *wie teuer stellt sich der Aufenthalt im Sanatorium pro Tag und Kopf?* Der Hauptteil der Kosten wird durch die Nahrungsmittel verursacht. Bei der Ernährung in Heilstätten finden, da die Aufbesserung des Kräftezustandes erste Aufgabe ist, die eiweissreichen Nahrungsmittel, namentlich Fleisch und Milch, ausgedehnte Anwendung. Da sie den Unbemittelten in unzureichendem Masse zugänglich sind, werden sie von den Sanatorienkranken mit Begierde genossen. Wird die Bemessung der Fleischportion dem Kranken selbst überlassen, so kommt dabei ein übermässiger Verbrauch zustande. Die vom Spaziergang mit äusserst regem Appetit zurückkehrenden Kranken nehmen Quantitäten zu sich, die von den Verdauungsorganen nicht ausgenutzt werden können und dabei eventl. noch zu Verdauungsstörungen führen, wie z. B. der überreichliche Genuss von Milch nicht selten zu Magenerweiterungen Anlass gibt. Hier ist eine unauffällige Regelung nötig. Am besten hat sich die Zuteilung von bestimmten Mengen der Fleischspeisen an kleinere Gruppen von Patienten bewährt, die, an einem Tisch vereinigt, unter sich selbst den Verbrauch regeln. Auch die Verabreichung kräftiger gebundener Suppen zum Beginn der Hauptmahlzeiten, nach Umständen unter Verwendung von billigen Eiweisspräparaten, wie sie heute die Nahrungsmittelindustrie mannigfach erzeugt, ist zweckmässig. Reichlich bemessene Zeit für die Mahlzeiten, fortgesetzte Erziehung der Pfleglinge zu richtigem Kauen bei gleichzeitiger Zahn- und Mundpflege u. s. w. sind wichtige Vorbedingungen für die Ernährung, auch in wirtschaftlicher Hinsicht.

In deutschen Volksheilstätten war vor Jahren der Pflegesatz von Mk. 3. pro Tag und Kopf als Norm angenommen worden. Er hat sich bei der neuerlichen Steigerung der Preise für Lebensmittel, Löhne, Kohlen u. s. w. nicht überall mehr einhalten lassen und musste vielfach auf Mk. 3.50 und mehr gesteigert werden. Die Beobachtung lehrt, dass fast die Hälfte davon auf die Beschaffung der Rohstoffe für die Ernährung aufgewendet werden muss.

Aus hygienischen und wirtschaftlichen Gründen ist es zweckmässig, in den Heilstätten *Anstaltskleidung* einzuführen. Nur so ist es möglich, eine genaue Kontrolle betreffs Reinlichkeit und praktischer Form der Kleidungsstücke auszuüben und in regelmässigen Zwischenräumen für die Desinfektion zu sorgen.

Wenn man der wichtigen Rolle gedenkt, welche die hygienische Erziehung der Kranken spielt, so wird man dem *systematischen Unterricht* in den Anstalten besonderen Wert beilegen müssen. Er ist ein wirksames Mittel, nicht allein die gesundheitsgemässe Gewöhnung zu unterstützen,

sondern auch die beschäftigungslose Zeit nutzbar zu verkürzen. In manchen Anstalten sind für die Unterrichtserteilung besondere Hauslehrer angestellt. Vor allem aber sollen die Aerzte nicht blos bei den Untersuchungen, Krankenvisiten u. s. w. die Pfleglinge unterweisen, sondern regelrechts Kurse nach vorher festgelegtem Programm abhalten. In Sanatorien für Frauen soll dabei die Belehrung, wie man einen Familienhaushalt nach einfachen Regeln gesundheitsgemäss führt, hierbei den Hauptgegenstand bilden.

Zur hygienischen Erziehung der Pfleglinge gehört mit in erster Linie, sie von der Infektiösität der Tuberkulose zu überzeugen und ihnen die *unschädliche Beseitigung des Sputums* zur Pflicht zu machen. Die Aufstellung von Spucknäpfen innerhalb der Anstalt ist vom erzieherischen Standpunkt nicht richtig. Um den Auswurf zu sammeln, erhält jeder Hustende eine Speiflasche. Im übrigen sollen die Kranken gewöhnt werden, Husten und Auswerfen möglichst zu unterdrücken. Die Desinfektion der Speiflasche soll dem Kranken als wichtige hygienische Massregel erscheinen, die er täglich zur bestimmten Stunde in ernster Weise vorzunehmen sich gewöhnen soll.

Eine wichtige Frage ist die Infektionsgefahr in Sanatorien und davon abhängend die Frage, ob irgendwelche streng abgegrenzte *Gruppierung der Kranken* erforderlich sei. Die allgemeine Anschauung gibt nachstehende Aeusserung von *Curschmann*, Friedrichsheim (Baden) wieder:

"Nach genauesten und eingehendsten Beobachtungen darf man der Ueberzeugung sein, dass der Grundsatz vollkommen zu Recht besteht, eine gut geleitete Heilstätte sei derjenige Ort, an welchem man sich am wenigsten leicht mit Tuberkulose infizieren kann. Die Infektionsgefahr in einer solchen Heilstätte ist so gering, dass eine Trennung zwischen offener und geschlossener Tuberkulose nicht erforderlich erscheint. Die Trennung ist aber auch nicht wünschenswert, weil die Bazillenfurcht dann noch weiter ins Unermessliche gesteigert würde, und die Kranken mit offener Tuberkulose von jedem Verkehr ausgeschlossen würden. Die Trennung ist aber auch nicht berechtigt, da mit den gegenwärtigen Untersuchungsmethoden eine grössere Anzahl von offenen Tuberkulosen doch nicht entdeckt wird, dieselben somit als geschlossene Tuberkulosen behandelt werden, während es tatsächlich offene sind. Dadurch wird die Infektionsgefahr eher gesteigert, weil die Kranken mit sogenannter geschlossener Tuberkulose die Vorsicht mit dem Auswurf ausser Acht lassen. Das einzig richtige ist nicht eine Trennung der geschlossenen von der offenen Tuberkulose, sondern eine streng durchgeführte Husten- und Spuck-Disciplin bei *allen* Kranken."

Die *Leitung eines Volkssanatoriums* muss in den Händen eines tüchtigen Chefarztes liegen, der seiner gesamten fachlichen Ausbildung nach über gründliche Kenntnisse auf allen Gebieten der Medizin verfügt und sich

für die hygienisch-diätetische Behandlungsmethode, insbesondere für das moderne Heilstättenwesen, durch längeren praktischen Dienst in einer derartigen Anstalt vorbereitet hat. Da strenges Individualisieren des einzelnen Falles Vorbedingung für den Erfolg ist, so wird man als Leiter einer Heilstätte einen älteren Arzt, der praktische Erfahrung mit hinreichender Menschenkenntnis vereinigt, zu wählen haben. Er muss die Fähigkeit besitzen, sich nicht nur als Mediziner in den Zustand der Kranken hineinzudenken, sondern, da die psychische Hygiene bei der Gesundung des Lungenkranken eine so hervorragende Rolle spielt, auch imstande sein, sich in das Gemüt seines Klienten hineinzuversetzen und durch Ermittelung der Einzelheiten seiner sozialen Lage ihn von kleinen Sorgen und Aengsten, die auf ihn deprimierend wirken, zu befreien. Nur so wird er zugleich der erzieherischen Seite des Heilverfahrens Rechnung tragen können, auf der nicht in letzter Linie der Wert der hygienisch-diätetischen Behandlungsmethode beruht. Alle diese wertvollen Eigenschaften dürfte nur ein älterer, erfahrener, gleichzeitig mit hervorragenden Eigenschaften des Geistes, Charakters und Herzens ausgestatteter Arzt besitzen, der mit Herzensgüte und klarem Kopf eine feste Hand verbindet. Es versteht sich von selbst, dass dem Chefarzte ausser der ärztlichen Leitung auch die Anstaltsverwaltung zustehen muss.

Die Erfahrung lehrt, dass es neuerdings schwer hält, die *Assistenzarztstellen* zu besetzen. Die jungen Aerzte bevorzugen mehr die allgemeinen Krankenhäuser, als die Sanatorien. Es ist nötig, diesem Mangel grundsätzlich durch geeignete Massnahmen abzuhelfen, wozu in erster Linie eine ausreichende Besoldung gehören würde. Ferner sollte man bei der Besetzung von Chefarztstellen nur solche Bewerber berücksichtigen, welche durch längere, bewährte Dienste in Sanatorien sich Anspruch darauf erworben haben. Die Heilstättenpraxis hat die Ansicht widerlegt, dass der Kreis der dirigierenden Aerzte sich aus jüngeren Assistenten innerer Kliniken rekrutieren könne. Es handelt sich beim Chefarzt nicht allein um die Beherrschung des klinischen Teiles der Behandlung, sondern auch um ein völliges Erkennen der sozialen Situation des einzelnen Kranken, das nur durch längere Spezialpraxis dem Arzte zu eigen wird.

Um eine derartige spezialistische Ausbildung von jungen Medizinern frühzeitig anzubahnen, wäre es zu wünschen, dass die Heilstätten—oder doch einzelne von ihnen—mit allen Hülfsmitteln für die wissenschaftliche Fortbildung der Aerzte ausgestattet werden. Vielleicht dürfte es auch nicht unzweckmässig sein, ärztliche Studienreisen speziell auch auf die Volksheilstätten auszudehnen.

Als *Pflegepersonal* werden in den Lungenheilstätten meistens Schwestern verwendet. Sie sind nicht in derselben Zahl erforderlich wie in den allgemeinen Krankenhäusern, da es sich in der Hauptsache um Patienten handelt,

die nicht bettlägerig sind. Es reichen deshalb für eine Anstalt von 100–120 Betten 3–4 Schwestern aus, wobei angenommen wird, dass die älteste als Oberschwester gleichzeitig den Betrieb der Küche überwacht und eine Schwester dem Wäschehaushalte vorsteht. In den meisten Heilstätten sind, um der Erörterung konfessioneller Zugehörigkeit aus dem Wege zu gehen, Schwestern vom Roten Kreuz tätig.

Der Umstand, dass manche Heilstättenpfleglinge frühzeitig erkennen, wie schädlich ihr bisheriger Beruf auf ihre Gesundheit wirkt, ist nicht selten Anlass, dass Kranke sich zur Erlernung des Wärterberufes in Lungenheilstätten bereit erklären, um damit die Möglichkeit längeren Aufenthaltes in denselben zu erreichen. Hier bietet sich die Möglichkeit, *tüchtige Wärter* für die Anstalten heranzubilden und damit gleichzeitig einer Reihe von Heilstättenpfleglingen in einem neuen Beruf ein Unterkommen zu schaffen. Vielleicht könnte man die Einrichtung regelrechter Schulen für Anstaltspersonal ins Auge fassen.

Zum Schluss dieses Kapitels noch einiges über Anstaltsdisziplin. Der langjährige Chefarzt Dr. *Groschke* (Grabowsee bei Berlin), dem eine besonders reiche Erfahrung zu Gebote steht, fasst diese Erfahrungen in folgenden Worten zusammen:

"Bei der Neigung unserer Zeit, die Freiheit des Individuums zu betonen, ist die strenge Aufrechterhaltung der Disziplin unumgänglich notwendig, um den Gang grosser Betriebe in Ordnung zu halten. Die Disziplin muss streng und gerecht gehandhabt werden ohne Ansehen der Person (Selbstzahler, bessere Stände). Nachsicht wird als Schwäche gedeutet; auf einen Fall, in dem Nachsicht geübt wurde, berufen sich hundert andere, die keine Nachsicht verdienen. Insbesondere muss die Hausordnung genau befolgt werden (pünktliches Erscheinen zu den Mahlzeiten, pünktliche Rückkehr vom Urlaub).

"Die ärztlichen Verordnungen, Liegestunden u. s. w. müssen peinlichst inne gehalten werden. Die Kranken müssen sehen, dass ärztlicherseits die Ueberzeugung besteht, dass nur unter genauer Beobachtung der Vorschriften die Kur nutzbringend ist. Die Kranken unterschätzen, da sie zumal in den Anfangsstadien kaum Schmerzen und Beschwerden haben, die Bedeutung der Krankheit und halten sich nur für erholungsbedürftig. Es ist oft notwendiger, sie ernstlich zu ermahnen, als sie in humaner Weise über ihren Zustand hinwegzutäuschen.

"Es empfiehlt sich, bei aller Strenge nicht schroff zu sein. Die Vorschriften und Befehle werden williger befolgt, wenn sie in der Form eines Wunsches, selbst einer Bitte gegeben werden. Ausserdem ist es wichtig, den Kranken die Bedeutung jeder Vorschrift durch Erläuterungen klar zu machen. Jede Woche halte ich den neu Aufgenommenen einen Vortrag über die Kur und unsere gesamten Vorschriften, um ihnen einen Einblick in die

Krankheit und ihre Bekämpfung durch unsere Kurmittel darzulegen. Wird dann gesündigt, so kann man dem Kranken vorhalten, wie er sich selbst schädigt und kein Interesse an seiner Gesundheit hat.

"Es gibt eine Reihe von Verfehlungen, bei denen man des Täters nicht habhaft wird. Ich habe dieselben immer zu einer Besprechung im Speisesaal benutzt und darauf hingewiesen, wie der unbekannte Täter sich selbst, die Gesamtheit und das Interesse der Anstalt schädigt.

"Alle Strafen dürfen nicht im Affekt verhängt werden. Die Tat ist ruhig zu prüfen und liegt der Fall klar, so erfolgt ohne grosse Aufregung die Verkündigung der Strafe in sachlicher Weise; dieselbe besteht ja meist in einer Verwarnung oder Entlassung. Liegt der Fall nicht klar, so ist durch Zeugenvernehmung Klarheit zu schaffen. Ist Anzeige durch einen Arzt oder Beamten, Schwester, die den Betreffenden abgefasst haben, erfolgt, so lasse ich ohne weiteres die Strafe eintreten und lasse mich auf vorgeschlagene Zeugen nicht ein. Die Zeugen ergreifen in solchen Fällen stets die Partei des Bestraften und suchen ihn als unschuldig darzustellen.

"Wie ist die Disziplin aufrecht zu erhalten, wenn Massenaufregung besteht? Von Zeit zu Zeit werden Kranke aufgenommen, die ihre Hauptaufgabe darin sehen, Unzufriedenheit zu erregen. Sie sind meist mit sich und der Welt zerfallen, sind mit nichts zufrieden und suchen auch die anderen aufzuregen, was ihnen nicht selten gelingt. Wenn es sich klar erweisen lässt, sind solche Leute zu entfernen. Meist sind sie sehr schlau, schieben andere zu Taten vor und halten sich im Hintergrunde. Es ist unglaublich, wie blindlings oft eine grosse Anzahl diesen Aufwieglern folgt und sie anstaunt. Ich habe auch bei Massenaufregungen die Ruhe zu bewahren gesucht, zur Ruhe ermahnt, es aber abgelehnt, mit der Masse zu verhandeln. Dabei kommt nichts heraus. Wenn sich nicht durch Deputierte verhandeln lässt, dann mag eine schriftliche Beschwerde aufgesetzt werden, die dann ordnungsgemäss erledigt wird. Ich habe noch nicht erlebt, dass die Anstalt auf Grund solcher Beschwerde einen Vorwurf erhielt. Sehr gut ist es, wenn von Zeit zu Zeit von dem Vorstand der Heilstätte oder Landes-Versicherungsanstalt u. s. w. jemand den Kranken den Standpunkt klar macht.

"Bezüglich der Verhandlung mit Deputierten möchte ich anfügen, dass ich es nicht für unzweckmässig halte, wenn die Kranken Vertrauensmänner wählen, bezw. einen Obmann, der die Wünsche sammelt und dem Chefarzt vorträgt. Mit wenigen Ausnahmen haben die Kranken Männer gewählt, die Vertrauen verdienten und mit denen sich reden liess. Ich bin ihnen freundlich und mit Achtung begegnet und habe den Erfolg gehabt, dass mir 'die Beschwerde' auch nur in Gestalt von Wünschen vorgetragen wurde. Was sich erfüllen liess, habe ich erfüllt, nicht Erfüllbares er-

klärend abgelehnt. Die Obmänner haben mir so manche kleinliche Beschwerde abgenommen, indem sie sie selbst zurückwiesen.

"Noch eine kurze Bemerkung über die Aufrechterhaltung der Ordnung im Verhalten der Patienten zu einander. Das ist in einer Heilstätte, in der der hauptsächlichste Teil aus organisierten Arbeitern besteht und daneben andere Elemente in der Minderzahl aufgenommen werden, ein sehr schwierige und zur vielen Verdriesslichkeiten führender Punkt. So weit es geht, werden die verschiedenen Elemente räumlich getrennt (Stube, Liegehalle). Aber wir haben nur in beschränkter Zahl kleine Liegehallen, die Anstalt ist stets vollbesetzt, und es kann nicht fortwährend verlegt werden, so dass bei der Spannung der Klassen doch immer Reibungen vorkommen. Eine böse Erscheinung ist der Terrorismus, mit dem die Organisierten vorgehen und anders Denkenden das Leben schwer machen. Fortwährende hinterlistige Neckereien, deren Urheber im Dunkeln bleiben, Sticheleien quälen den Betroffenen. Wer einigermassen fest auftritt, ist allerdings meist im Stande, sich die gebührende Achtung und Ruhe zu sichern. Aber es gibt eine grosse Zahl Nervöser, die schon an und für sich alles mehr fühlen als andere Leute und auch eine unschuldige Neckerei übelnehmen. Wird das bekannt, dann ist kein Halten.

"Die Anstalt muss natürlich diesen Dingen mit Energie entgegentreten und Leute, die die Ruhe anderer stören, entfernen. Man muss dabei aber vorsichtig sein. Wird ein solch Schuldiger, der meist einen grossen Anhang hat, entlassen, dann hat der Ankläger nachher kein gutes Leben. Ich habe daher soviel als möglich durch Verlegung solcher Unglücklichen Hülfe zu schaffen versucht und ausserdem beide Parteien eindringlich vermahnt—die einen, Ruhe zu halten, die andern, die Sache nicht zu ernst zu nehmen. Wiederholt habe ich den Erfolg gehabt, dass dann Ruhe eintrat und sogar manche selbst beantragte Verlegung zurückgenommen wurde, da es 'jetzt ganz gut ginge.'

"Gerade Zänkereien und Streitigkeiten habe ich durch ruhiges Anhören erledigt. Die Aufregung hatte sich meist bis zum folgenden Tag, wo ich die Gegenpartei vornahm, gelegt, und es liess sich ein Vergleich herbeiführen. War der Streit nicht beizulegen, habe ich meist beide Gegner entlassen, um sich draussen durch Klage ein Recht zu suchen."

3. Behandlungsergebnisse.

Will man die Behandlungsergebnisse in den Heilstätten betrachten, so muss man sich über den *Begriff "Heilung"* klar werden. Es gibt, wie die Befunde bei Sektionen immer wieder bestätigen, eine *Heilung im pathologisch-anatomischen Sinne.* Die Zahl solcher völligen Ausheilungen wird von den verschiedenen Sanatorien-Aerzten verschieden hoch angegeben. Es ist dies bei der Vielgestaltigkeit der Lungentuberkulose und ihrer Ab-

hängigkeit von den allgemeinen Lebensbedingungen ganz begreiflich. Das Krankenmaterial ist zweifellos ein ungleichmässiges und bei der schwierigen Beurteilung des Grades der Heilung ist subjektivem Ermessen mehr oder weniger Spielraum gegeben.

So wünschenswert es ist, diesen höchsten Grad der "Heilung" zu erreichen, so lehrt doch die Erfahrung, dass er in sehr vielen Fällen trotz voller Kräftigung des Körpers und völliger Wiederherstellung der Arbeits- und Erwerbsfähigkeit niemals erreicht wird.

Der Krankheitsprozess in den Lungen bildet sich bis zu einem gewissen Grade zurück, ohne dass es zur völligen Vernarbung kommt. Kavernen bleiben bestehen und schliessen sich mit ihrem Inhalt gegen das gesunde Gewebe ab. Das allgemeine körperliche Wohlbefinden kann alsdann den höchsten Grad erreichen, weil der Prozess zum Stillstand gekommen und die giftigen Stoffwechselprodukte der Tuberkelbazillen in den Saftstrom nicht mehr aufgenommen werden. Jeder Arzt kennt zahlreiche Beispiele einer derartigen "Heilung." Man bezeichnet sie im Gegensatz zu der "Heilung" im anatomischen Sinne als "*Heilung im wirtschaftlichen Sinne.*"

Es bedarf keiner weiteren Erörterung, von welch' grosser Bedeutung für die Tuberkulose-Bekämpfung diese Erkenntnis von der Häufigkeit solcher "Heilungen im wirtschaftlichen Sinne" sein müsste. Im Zusammenhang mit der Beobachtung, dass es nur eines verhältnismässig kurzen Aufenthaltes in Spezial-Heilanstalten bedürfe, um diese Stufe der Besserung zu erreichen, von der aus verständigen Patienten bei richtiger Lebensführung, erwerbbringender Beschäftigung und weitere Fortschritte—oft sogar bis zur Heilung im anatomischen Sinne—zugänglich sind, ist diese Erkenntnis hauptsächlich Anlass gewesen zur Verallgemeinerung der hygienisch-diätetischen Behandlungsmethode in Volkssanatorien.

Bei durchschnittlich dreimonatiger Heilstättenkur wird eine derartige Heilung im wirtschaftlichen Sinne in etwa 70–80% der behandelten Fälle erreicht.

Von ausschlaggebender Bedeutung ist naturlich die Frage nach der *Dauer der Behandlungsergebnisse.* Von ihrer günstigen Beantwortung hängt es ab, ob das Volkssanatorium überhaupt als ein geeignetes Instrument bei der Tuberkulosebekämpfung angesehen werden kann oder nicht. Hier lassen erfreulicher Weise die jetzt zehnjährigen, sehr umfangreichen Erfahrungen der deutschen Arbeiter-Versicherung keinen Zweifel, dass die geschilderte Heilung im wirtschaftlichen Sinne in der Mehrzahl der Fälle eine dauernde ist, und dass der durch die Heilstättenkuren entstehende Kostenaufwand gerechtfertigt ist.

Drei auf diesem Gebiet besonders erfahrene Sachverständige äussern sich hierzu wie folgt:

"Nicht nur der Erfolg zur Zeit der Entlassung," schreibt *Dr. Richard*

Freund, Direktor der Landes-Versicherungs-Anstalt Berlin, welche bekanntlich die ausgedehnten Volkssanatorien in Beelitz bei Potsdam mit nahezu 1000 Betten besitzt, "sondern auch die Dauer desselben lässt das Heilverfahren in einem günstigen Lichte erscheinen. Von 79 mit Erfolg behandelten Männern aus dem Jahre 1897 sind 10 Jahre später noch 36 erwerbsfähig geblieben—fast die Hälfte,—und der Prozentsatz der erwerbsfähig Gebliebenen aus den weiteren Behandlungsjahren 1898 bis 1906 steigt bei beiden Geschlechtern fast regelmässig. Wir haben auf Grund des Quittungskartenmaterials der Versicherten feststellen lassen, welche Beiträge die Verpflegten nach Ablauf ihres Heilverfahrens durch Beibringung von Marken an die Versicherungsanstalt abführten. Dabei wurde gefunden, dass von 36 erwerbsfähig Gebliebenen des Jahres 1897 27 weiter Marken verwendet haben. Im Durchschnitt haben diese 27 Männer nach Abschluss des Heilverfahrens 6 Jahre gearbeitet und pro Person 100 Mk., im ganzen also 2700 Mark, Beiträge geleistet. Gewiss stellen diese Beiträge nur einen Teilbetrag der Kosten des Heilverfahrens dar, aber die Erhaltung der Arbeitskraft von 27 Personen für 6 Jahre bedeutet bei Zugrundelegung eines für Berliner Arbeiterverhältnisse minimalen Jahreseinkommens von 1000 Mark eine Vermehrung des Nationalvermögens von $27 \times 6000 = 162{,}000$ Mark, hinter denen die Aufwendung für das Heilverfahren ganz erheblich zurück bleibt. Hierbei ist aber nur die Erwerbsfähigkeit des betreffenden Mannes selbst zu Grunde gelegt. Ganz unberücksichtigt sind hierbei die Zahlen, welche sich ergeben würden, sobald der Ernährer der Familie stirbt: nämlich die Summen für die Unterstützung der Hinterbliebenen und die Kosten für die Erziehung der Kinder, welche der Gemeinde meist zur Last fallen. Unter diesem Gesichtspunkte kann man die Behauptung, dass die für die Lungenheilstätten aufgewendeten Millionen nicht in richtigem Verhältnis zu dem sozialen, durch die Behandlung erzielten Erfolge stehen, nicht für berechtigt anerkennen. Vielmehr ist kein Geldopfer zu gross zu erachten, um dadurch Tausenden von Arbeitern Gesundheit und Leben für sich und ihre Familie zu erhalten. Wenn auch der finanzielle Effekt bei der Behandlung von weiblichen Versicherten nicht derselbe ist, wie bei den Männern, da erstere zum grossen Teil nach ihrer Verheiratung aus der Versicherung ausscheiden, und keine versicherungspflichtigen Arbeiten ausüben, so bleibt auch volkswirtschaftlich die Gesundheit der Mutter von so grossem Werte, auch für die Nachkommenschaft der arbeitenden Bevölkerung, dass man die versicherungs-technischen Bedenken unterdrücken und auch auf die Durchführung der Behandlung für die weiblichen Lungentuberkulösen auf Kosten der männlichen Arbeiter, welche indirekt dadurch Vorteil haben, bedacht sein muss."

Ferner schreibt Geheimrat *Bielefeldt,* Direktor der Landes-Versicher-

ungs-Anstalt Lübeck und langjähriger Spezialreferent im Reichs-Versicherungsamt:

"Nach einer im Reichs-Versicherungsamt bearbeiteten Statistik der Heilerfolge bei 159,802 Tuberkulösen, die in den 10 Jahren 1897 bis 1906 von der deutschen Invalidenversicherung in Lungenheilstätten behandelt worden sind, waren von je 100 behandelten Tuberkulösen 5 Jahre nach der Behandlung noch 27 bis 42 in den verschiedenen Kontrollperioden erwerbsfähig. Nimmt man nun an, dass diese Erwerbsfähigen einen Durchschnittslohn von täglich 2 Mk. verdienten, so bedeutet das für die kontrollierten Jahre unter Zugrundelegung eines durchschnittlichen Dauererfolges von 34 Prozent einen Arbeitsverdienst von rund 235 Millionen Mark, der den Familien tuberkulöser Arbeiter zugute gekommen, um den das Nationalvermögen gewachsen ist. Dazu treten 4½ Millionen Mark Rentenersparnis der Versicherungs-Anstalten und schätzungsweise mindestens weitere 4½ Millionen Mark, die an Aufwendungen der Armenbehörden für die Familien Tuberkulöser entbehrlich wurden. Hiernach hat die Behandlung der 159,802 Tuberkulösen in Deutschland nahezu eine Viertelmilliarde Mark innerhalb eines Zeitraums von 5 Jahren nach der jedesmaligen Heilstättenbehandlung eingebracht."

Endlich berichtet *Dr. Rumpf*, Ebersteinburg (b / Baden-Baden), langjähriger Chefarzt der badischen Volksheilstätten, Folgendes:

"Irrig ist die Meinung, dass—wenn einmal Tuberkelbazillen im Auswurf gefunden werden—wirkliche Dauererfolge selten mehr erreicht werden. Die Dauererfolge der Kranken mit Tuberkelbazillen im Auswurfe sind beinahe ebenso gut wie bei der Summe aller Behandelten. Mein Nachfolger in Friedrichsheim, Dr. Curschmann, stellte bei den früheren Kranken dreier Jahrgänge fest, dass jeweils 5 Jahre nach der Entlassung arbeitsfähig befunden wurden:

vom	I.	Stadium	86,	bezw. 86	bezw.	85%
"	II.	"	78,	" 61	"	63%
"	III.	"	18,	" 25	"	21.5%.

Ausschliesslich bei solchen Kranken, welche während der Kur Tuberkelbazillen im Auswurf gehabt und eine Kur von mehr als 6 Wochen durchgemacht haben, wurden aus denselben 3 Jahrgängen jeweils 5 Jahre nach der Entlassung arbeitsfähig befunden:

vom	I.	Stadium	55.5	bezw. 80	bezw.	80%
"	II.	"	44.	" 27	"	56%
"	III.	"	15.5	" 22	"	17%."

Betreffs der Dauererfolge ist schliesslich noch von Wichtigkeit die Erfahrung, dass innerhalb grosser Betriebe, z. B. in den Betrieben der Eisen-

bahnen, Knappschaften u. a., die einerseits ein System von vertrauensärztlicher Kontrolltätigkeit und vielfach eigenen Heilstätten besitzen und andererseits ihren Versicherten nach Rückkehr aus der Heilstätte noch einige Zeit bei der Arbeit zweckentsprechende Schonung gewähren können, die Dauererfolge noch ungleich bessere sind, als bei der versicherten Arbeiterbevölkerung der Landes-Versicherungs-Anstalten, die fluktuierend, weniger übersehbar, und in vielen Einzelberufen—ohne wohlwollenden Rückhalt beim Arbeitgeber—erwerbstätig ist.

Das einwandsfreieste Mittel, die Nachhaltigkeit der Heilstättenerfolge bei der Lungentuberkulose festzustellen, sind *planmässig durchgeführte Nachuntersuchungen.* Um die nicht geringen Unterschiede in der subjektiven Bewertung des Lungenbefundes durch verschiedene Untersucher als störenden Faktor auszuschalten, ist es erwünscht, dass die Nachuntersuchungen möglichst durch den früheren behandelnden Arzt selbst ausgeführt, dass sonst aber die Nachuntersuchungen bestimmt abgegrenzter Gruppen von Kranken stets von dem gleichen Arzt vorgenommen werden. Hand in Hand mit den Nachuntersuchungen müssen sorgfältige Erhebungen über die bis dahin etwa schon verstorbenen Heilstättenpfleglinge, soweit sie in den Kreis der Nachuntersuchungen entfallen, einhergehen. Nach diesen Gesichtspunkten organisierte Nachuntersuchungen werden zur Zeit in Deutschland vom Kaiserlichen Gesundheitsamte durchgeführt.

4. Ergänzende Massnahmen.

Die wichtigste Ergänzung des Volkssanatoriums bildet die Erholungsstätte. Auf dem Berliner Tuberkulose-Kongress im Jahre 1899 wiesen die Berliner Aerzte Dr. Becher und Dr. Lennhoff darauf hin, dass die in Heilstätten verfügbaren Plätze niemals dem ungeheuren Bedürfnis genügen würden, und dass die erheblichen Kosten des Heilverfahrens einer absoluten Verallgemeinerung der Heilstätten-Behandlung im Wege stehen müssten. Um einerseits die Zeit der Rekonvaleszenz für die in minderwertigen Wohnungsverhältnissen befindlichen Kranken möglichst günstig zu gestalten, andererseits den Platzmangel für die auf Heilstätten-Behandlung wartenden Tuberkulösen weniger fühlbar zu machen, regten sie an, in der Nähe der Grossstädte Einrichtungen zu schaffen, in denen der Kranke wenigstens während des Tages nach den Grundsätzen der hygienisch-diätetischen Behandlungsmethode versorgt werden könne, so dass er nur die Nacht in seiner Wohnung zuzubringen brauche. Es ist bekannt, wie diese Anregung, nachdem das Rote Kreuz alsbald zu Versuchen bei Berlin die Hand geboten hatte, zur Errichtung zahlreicher Walderholungsstätten geführt hat.

In der Erholungsstätte finden sich Tuberkulöse aller Stadien, von den Erkrankten, die nur als tuberkuloserverdächtig bezeichnet zu werden

pflegen, bis zu den tuberkulösen Siechen. Unter den Frühfällen von Tuberkulose befindet sich eine beträchtliche Zahl von solchen, die von ihren Kassen für Lungenheilstätten angemeldet sind, dort aber, weil die Anstalten überfüllt sind, noch aufgenommen werden können. Diese Kranken verbleiben in der Erholungsstätte, bis sie von den Heilstätten einberufen werden. Bei einer zweiten Reihe von Frühfällen zeigt sich erst bei ärztlicher Beobachtung in der Erholungsstätte, dass von einer Kur in der Lungenheilstätte grosser Nutzen zu erwarten sei. Diese Kranken werden angehalten, bei ihrer Versicherungs-Anstalt die Aufnahme in die Heilstätte zu beantragen. Weiterhin finden sich in den Erholungsstätten Tuberkulöse, welche bereits früher eine Kur in der Lungenheilstätte durchgemacht haben und aus äusseren Umständen eine notwendig scheinende, erneute Aufnahme in eine solche Anstalt nicht erlangen können. Schliesslich erscheinen in der Erholungsstätte sieche Tuberkulöse, denen während der Sommermonate die Erholungsstätte dasjenige bietet, was für sie durch Einrichtung von Asylen für Tuberkulöse erst noch angestrebt wird.

Besonders erfreulich ist es, dass die Erholungsstätten auch von verheirateten Frauen, die schwerer als ledige sich von ihrer Häuslichkeit trennen, zahlreich benutzt werden. Man erleichtert ihnen den Besuch durch die Erlaubnis, ihre kleinen Kinder unentgeltlich mitbringen zu dürfen. Als selbstverständlich darf gelten, dass die Tuberkulösen auch in den Erholungsstätten durch Wort und Schrift belehrt und zu hygienischer Lebensweise erzogen werden.

Unerlässliche Ergänzungen für die erfolgreiche Heilstätten-Behandlung bilden die Familienfürsorge während der Kur und die Arbeitsvermittlung nach der Kur.

Sicherstellung der Angehörigen gegen die äussere Sorge und Not, solange sich der Ernährer als krank in der Anstalt befindet, ist eine wesentliche Vorbedingung, dem Kranken neben der physischen die ebenso nötige seelische Ruhe zu verschaffen. Die deutschen Versicherungskassen übernehmen deshalb die Unterstützung der Familien als einen Teil der Ausgaben für die Behandlung, welche sie ihren lungenkranken Versicherten im prophylaktischen Sinne zur Ersparung der drohenden Rente zu Teil werden lassen. Die Tätigkeit der an der Tuberkulose-Bekämpfung beteiligten Vereine erstreckt sich vorzugsweise nach dieser Richtung. Vor allem ist aber durch die Vervollkommnung der Fürsorgestellen (dispensaires) und ihre Entwicklung zu örtlichen Zentralstellen für Tuberkulose-Bekämpfung diese unentbehrliche Ergänzung des Heilstättenwesens allgemeiner Regelung erschlossen worden. Von dem bevorstehenden weiteren Ausbau der Arbeiterversicherung wird man für diese Bedürfnisse noch mehr Befriedigung erwarten dürfen.

Wie während der Kur, so ist auch nach der Entlassung aus der Heilstätte

noch Fürsorge für die genesenden Lungenkranken erforderlich. Es ist zwar in sehr vielen Fällen wesentliche Besserung erreicht, aber es bedarf doch noch weiterer Beobachtung und Nachhülfe zur Befestigung des Erfolges der "Heilung im wirtschaftlichen Sinne." Der Wiedereintritt in die Arbeit sollte möglichst wenig schroff sein und allmählich erfolgen können. Manche Wohlfahrteinrichtungen ermöglichen noch einige Wochen Besuch der Tageserholungsstätten, oder eine gewisse Zubusse zur Nahrung in Form von Essmarken in Volksküchen. Auch hier bringen die Fürsorgestellen immer mehr System in die Sache, vor allem durch ständige Gewichtskontrolle und Nachuntersuchung.

Von wesentlicher Bedeutung ist, dass, so schwierig es auch sein mag, die Vermittlung geeigneter Arbeit als unentbehrliches Erfordernis verallgemeinert wird. Es wurde schon erwähnt, dass in grossen Betrieben, in welchen die zurückgekehrten Lungenkranken wenigstens einige Zeit noch in leichterer Arbeit beschäftigt werden können, der Erfolg einer verbrachten Kur im Volkssanatorium eher von Dauer ist, als im freien Arbeitsleben, das den Arbeiter ohne Uebergang in die volle Lohnarbeit zwingt. Die Fürsorgestellen und die Tuberkulose-Vereine müssen deshalb nicht müde werden, die Arbeitgeber zur Mitwirkung zu gewinnen und die noch immer weit verbreitete, unbegründete Furcht vor Ansteckung zu bekämpfen.

Zur Erreichung gemeinsamer Ziele haben sich die Heilstätten-Entlassenen in manchen Fällen zu Vereinen organisiert.

"Solche Vereine ehemaliger Heilstättenpfleglinge," schreibt *Gebser* (Carolagrün), "können sehr viel zur Bekämpfung der Tuberkulose leisten, aber nur, wenn sie unter der Aufsicht einer autoritativen Persönlichkeit, am besten eines Heilstätten-Chefarztes, bleiben. Durch gegenseitige Unterstützung in Notlagen, durch Ausbildung für einen gesunden Beruf, durch Stellenvermittelung, durch Veranstaltungen von Vortragsabenden mit Belehrungen über die Gesundheitspflege u. a. haben die s. Z. in Leipzig und Hamburg gegründeten Vereine sehr nützlich gewirkt, sind aber auseinandergefallen, weil es den Heilstätten-Chefärzten unmöglich war, dauernd diese Organisationen im Detail zu leiten. Nach Entstehung der Fürsorgestellen für Lungenkranke sind die genannten Vereine nicht mehr so dringendes Bedürfnis wie vorher."

5. Kinderheilstätten.

Es erübrigt noch, einiges über die Kinderheilstätten anzufügen. Sie bilden in unserem grossen Kreuzzug ein wesentliches, in nächster Zukunft vielleicht das wesentlichste Hülfsmittel. Die systematische Tuberkulose-Bekämpfung muss sich als Ziel setzen, die tuberkulösen Familien soweit zu sanieren, dass von ihren Mitgliedern eine weitere Ansteckungsgefahr nicht mehr ausgeht. Seitdem die Tätigkeit der Fürsorgestellen sich immer

mehr in dieser Richtung erstreckt, und das Ausnehmen der Tuberkulosenester Spezialaufgabe geworden ist, hat man in den betroffenen Familien zahlreiche, bereits tuberkulöse oder durch die Krankheit bedrohte Kinder ermittelt. Diese frühzeitig der hygienisch-diätetischen Behandlung zu unterwerfen, ihren Körper rechtzeitig, namentlich für die Entwicklungsjahre und den Eintritt in den Beruf, zu stärken, sie vor allem auch mit hygienischen Sitten und Gewohnheiten auszustatten, heisst der Tuberkulose im Erwerbsalter die Wurzel beschneiden.

Die meisten der früher errichteten Kinderheilstätten an der See, in Solbädern u. s. w. galten ausschliesslich den Vorstadien der Tuberkulose und schlossen die Aufnahme von Kindern mit Tuberkulose aus. Erst neuerdings hat man auch tuberkulösen Kindern die hygienisch-diätetische Behandlung systematisch eröffnet. Der Grund der verzögerten Fürsorge ist in der mangelnden Deckung der Kosten zu suchen. Da selbst in Deutschland, dem Lande der Arbeiter-Versicherung die Fürsorge erst mit dem beginnenden Erwerbsalter, dem sechzehnten Lebensjahre, einsetzt, so mussten für das Alter darunter erst neue finanzielle Kräfte mobil gemacht werden. Dies hat sich mit dem zunehmenden Verständnis für die Tuberkulosebekämpfung erreichen lassen, dass die Gemeinden im Sinne der prophylaktischen Armenpflege die Kosten für die Behandlung tragen. Grosse Gemeinden senden alljährlich viele hunderte von kleinen Pfleglingen den Vereins-Anstalten zu und sind vielfach im Begriff, eigene Kinderheilstätten zu errichten.

Bau, Einrichtung und Betrieb unterscheiden sich im allgemeinen nicht von den Heilstätten für Erwachsene; nur, dass in ihnen womöglich noch mehr der volkserzieherischen Seite Rechnung zu tragen ist. Alle Einrichtungen für den persönlichen Bedarf sind in einfachsten hygienischen Formen zu halten. Nichts soll den Kindern angewöhnt werden, was im elterlichen Haushalt aus Mangel an Mitteln nicht fortgesetzt werden kann. Deshalb Licht und Luft, Wasser und Seife in Hülle und Fülle, aber in denkbar einfachster Anwendungsform und unter fortgesetzter Belehrung, wie man nach einfachen Regeln gesund wohnen, schlafen, atmen, kauen, sich abhärten, reinigen und bewegen kann.

Auch hinsichtlich der Wahl des Platzes gelten die gleichen Grundsätze wie bei den Heilstätten für Erwachsene. Wenn es an sich auch keinem Zweifel unterliegt, dass der Erfolg einer hygienisch-diätetischen Kur für das Kindesalter durch die Einwirkung der Seeluft und bestimmter Mineralbäder unterstützt wird, so ist im Interesse der Begründung ausreichender Anstalten doch nachdrücklich zu betonen, dass jeder Bezirk, der Interesse hat, eine Anstalt zu errichten, den Ort dazu nicht erst in weiter Ferne zu suchen braucht. Die Anstalten sollen inmitten des jeweiligen Bedürfnisgebietes errichtet werden. Die Befolgung dieses allgemeinen Grundsatzes schliesst nicht aus, dass gegebenen Falles einmal ein Kind in

ein entfernt gelegenes Spezialbad geschickt wird. Uebrigens lassen sich wirksame Badeeinrichtungen für Solbäder auch künstlich in jeder Heilstätte beschaffen.

Die Erfahrungen in Kinderheilstätten weisen, vielleicht noch mehr als die in Anstalten für Erwachsene, auf die Zweiteilung der Behandlung in Ruhekur und Beschäftigungskur hin. Sie ist deshalb von besonderer Wichtigkeit, weil bei den Kindern durch die Beschäftigung mit gärtnerischen und geeigneten hauswirtschaftlichen Arbeiten die Berufswahl in zweckentsprechender Weise beeinflusst werden kann. Die Erfahrungen in dieser Hinsicht sind noch gering, zeigen aber schon zweifellos die Notwendigkeit, die Kinderheilstätte mit einer ländlichen Kolonie zu verbinden, in welcher für die älteren Knaben und Mädchen eine regelrechte Ausbildung zu landwirtschaftlichen und hauswirtschaftlichen Berufen möglich ist.

Die Behandlungsergebnisse sind bei Kindern noch erfreulicher als bei Erwachsenen. 75% und mehr der behandelten Fälle werden geheilt oder wesentlich gebessert. Auch hier gewinnt die vorsichtige, reaktionslose Tuberkulin-Behandlung wegen ihrer zweifellos günstigen Einwirkung immer mehr Terrain. Das Hauptresultat ist in der systematischen Erziehung gefährdeter Kinder zu gesundheitlicher Lebensweise zu erblicken, so dass schon die nächste Generation der grossen Volksseuche mit besseren Hülfsmitteln gegenüberstehen wird.

Eine besonders wichtige Frage in Kinderheilstätten betrifft den Schulunterricht, der zuerst in Hohenlychen in den Kinderheilstätten vom Roten Kreuz eingerichtet worden ist. Dort erhalten alle Kinder täglich eine Stunde nach speziellem Lehrplan. Diese Einrichtung stellte anfangs lediglich eine Beschäftigungsmassnahme dar. Mit der zunehmenden Zahl der Pfleglinge aus schulpflichtigem Alter trat aber die Forderung nach regelrechten Einrichtungen vom schultechnischen Standpunkt in den Vordergrund. Es unterliegt keinem Zweifel, dass in dieser Richtung noch Fortschritte zu machen sind und dass die volkserzieherische Seite der Heilstättenkur bei Kindern durch spezialistische Mitwirkung geeigneter Lehrkräfte, welche nach den Direktiven und unter ständiger Aufsicht des verantwortlichen Arztes den Unterricht erteilen, noch weiter ausgebildet werden kann.

Auch die Kinderheilstätten mit ihren ländlichen Kolonien bedürfen der ergänzenden Einrichtungen. Dazu gehören, zu denselben Zwecken wie bei den Erwachsenen, in erster Linie die Erholungsstätten, ausserdem aber die Ferienkolonien, welche alljährlich während der Schulferien tausende von erholungsbedürftigen Kindern unbemittelter Eltern an die See oder in die Berge und Wälder senden. Von den allgemeinen Ferienkolonien werden aber wegen etwaiger Infektionsgefahr gerade die lungenkranken und tuberkuloseverdächtigen Kinder ausgeschlossen. Deshalb müssen für diese

noch Spezial-Kolonien, am besten im Zusammenhang mit Kinderheilstätten, geschaffen werden. Sie stellen während der 4 Ferienwochen eine vorzügliche Beobachtungsstation dar, in welcher der überwachende Arzt leicht diejenigen Kinder herausfindet, welche für die Lungenheilstättenkur in Betracht kommen.

Schluss.

Die vorstehenden Erfahrungen, die durch Einzelheiten über die verschiedensten Fragen leicht vervollständigt werden könnten, lassen erkennen, welch' wichtiges Instrument die Volksheilstätte bei der Tuberkulose-Bekämpfung ist. Sie ist in erster Linie Erziehungsanstalt für Volksgesundheitspflege und ihre Verallgemeinerung stellt ein heroisches Mittel der Volksaufklärung dar.

Diese Haupteigenschaften wird sie auch behalten, selbst wenn ihr mit fortschreitender Entwicklung der Tuberkulose-Bekämpfung eine veränderte Bestimmung gegeben werden müsste. Dass in dieser Beziehung verschiedene Wünsche vorgebracht worden sind, ist bekannt.

Man hat die Frage aufgeworfen, ob die heutige Versorgung der Lungenkranken in Heilstätten auf richtiger Auslese und zweckmässiger Klassifikation der Kranken begründet ist, und ob nicht etwa bei anderer Ausnützung der Tuberkulose-Einrichtungen der schliessliche Effekt des in Sanatorien investierten grossen Kapitals für die Bekämpfung der Krankheit erhöht werden könnte. Es wurde in dieser Beziehung darauf hingewiesen:

1. Dass in die Heilstätten eine grosse Zahl von Pfleglingen aufgenommen würden, die nicht tuberkulös seien.

2. Dass diese Leute den eigentlich Heilstätten-Bedürftigen wertvolle Plätze entzögen.

3. Dass die notwendige und angestrebte Absonderung vorgeschrittener Fälle in besonderen Stationen der allgemeinen Krankenhäuser oder in besonderen Tuberkulose-Krankenhäusern praktisch nicht erreicht würde, wegen des Odiums, das dem Krankenhause der Heilstätte gegenüber dauernd anhaftet.

4. Dass deshalb die Heilstätten viel mehr als bisher den weiter vorgeschrittenen Fällen dienen sollten.

5. Dass sie deshalb entlastet werden sollten, indem die heute das Gros bildenden Anfangsfälle den billigeren Walderholungsstätten überwiesen würden.

6. Dass es schliesslich bei der fortschreitenden Verbesserung der Familienpflege durch die Fürsorgestellen in vielen Fällen ausreichen würde, Anfangs- und Verdachtfälle in ambulatorische Behandlung zu nehmen.

All diese Fragen erschienen nach den heutigen Erfahrungen noch nicht spruchreif. Den vielen Freunden einer Verwertung der Heilstätten für die

schwereren Fälle stehen ebenso viele, vielleicht mehr Sachverständige gegenüber, die das Charakteristikum der Heilstätte in der Behandlung der Anfangsstadien erblicken.

Die Heilstätten-Erfahrungen von grundsätzlicher Bedeutung lassen sich in folgenden Schlusssätzen zusammenfassen:

1. Die Behandlung Tuberkulöser nach hygienisch-diätetischer Methode ist entsprechend dem ätiologischen Grundsatz, dass zur Entstehung der Tuberkulose Disposition und Tuberkelbacillus gehören, bei strenger Individualisierung unter allen Umständen zweckmässig. Sie vermehrt durch Regelung der Lebensbedingungen des Kranken die Widerstandsfähigkeit des Körpers, dessen Schutzstoffe gegen den Krankheitserreger für längere oder kürzere Zeit gesteigert werden. Sie schliesst die Anwendung keines Heilmittels aus, sondern unterstützt die Wirkung jedes einzelnen und wird auch, falls es einmal spezifische Mittel zu entdecken gelingen sollte, für deren nutzbringende Verwertung die Grundlage bilden.

2. Die hygienisch-diätetische Behandlung ist am erfolgreichsten in Volksheilstätten durchzuführen.

3. Die hygienisch-diätetische Behandlung ist nicht an ein bestimmtes, bevorzugtes Klima gebunden. Heilstätten können überall da errichtet werden, wo aus Gründen der Tuberkulose-Bekämpfung ihr Vorhandensein erwünscht erscheint.

4. Die Ansteckungsfurcht, welche der Anlage von Heilstätten noch vielfach in den Weg tritt, ist absolut unbegründet. Die Ansteckungsgelegenheit in einer gut eingerichteten und geleiteten Heilstätte ist geringer als in allen öffentlichen Verkehrslokalen, in denen unerkannt Schwindsüchtige verkehren und Tuberkelbazillen verbreiten können.

5. Volksheilstätten sollen mustergültige hygienische Einrichtungen erhalten, auch eines gewissen Krankenkomforts nicht entbehren, im übrigen aber in Einrichtung und Betrieb nicht zur Verwöhnung der Pfleglinge Anlass bieten.

6. Wie für die Tuberkulösen des Erwerbsalters sind auch für Kinder mit tuberkulösen Erkrankungen Spezialheilstätten für die hygienisch-diätetische Behandlung erforderlich.

7. Mit der hygienisch-diätetischen Behandlung als Ruhekur soll in Volksheilstätten eine Beschäftigungskur mit Arbeiten im Freien unter ärztlicher Kontrolle verbunden werden. Diese Beschäftigungskur ist so einzurichten, dass sie bei Kindern die Berufswahl, bei Erwachsenen den Berufswechsel erleichtert.

8. Die hygienische Erziehung der Heilstättenpfleglinge ist für die Hebung der Volksgesundheit im allgemeinen und für die Tuberkulose-Bekämpfung im besonderen von weittragender Bedeutung. Der Aufenthalt in der Anstalt soll systematisch hierzu verwendet werden. Für den Unterricht

GENERAL PLAN OF MEASURES FOR THE PREVENTION OF TUBERCULOSIS.

(Drawn up by Prof. Dr. Pannwitz, Berlin, Secretary-General of the International Association.)

INTRODUCTORY REMARKS.—(1) Tuberculosis is an infectious disease and must be combated according to principles whose value has been tested in the prevention of acute epidemics.

(2) The chief measures are: (*a*) the identification of persons suffering from the disease; (*b*) the destruction of the germs scattered by them; (*c*) the isolation of patients and their separation from healthy persons as long as they continue to emit disease germs.

(3) Tuberculosis, however, is a very wide-spread disease, already deeply rooted in the people of the country, and therein unlike diseases that threaten from foreign countries. A single case of tuberculosis, moreover, lasts not merely days and weeks, but on an average a number of years. Compul-ory measures, like those, for example, taken against cholera, would consequently have to be of such a drastic nature under modern conditions that they would paralyze all public life. To confront this complicated epidemic disease, therefore, we need—keeping strictly in view the principles mentioned—more complex measures and arrangements.

(4) In the general plan an attempt is made, in conformity with the results of experience, to give a clear survey of the modern preventative measures and of the part taken by the various agencies working for the public weal.

	No.	Designation of the Measure.	Description of the Measure.	I. Part Played by Public Agencies.				II. Part Played by Private Agencies.			
				State	Municipalities	Insurance Establishments	Sick Funds.	Employers of Labor.	Charitable Foundations	Clubs, Leagues, etc.	General Committee against Tuberculosis.
1	2	3	4	5	6	7	8	9	10	11	12
(A) Identification of Diseased Persons	1.	*Compulsory Notification*	In cases of death. In cases of illness with expectoration containing bacilli. Hospitals. Arrangements for accommodation of travelers (hotels, etc.).	Legislative introduction of compulsory notification. Special training of surgeons and medical assistants. Statistics regarding causes of death. Statistics on causes of disablement. Sanitary inspection.	Free disinfection of dwelling- and articles in use. Respective duties of charity doctors and school doctors.	Functions of consulting surgeons.	Functions of lodge doctors.	Functions of the factory doctors.	Functions of the doctors of the said institutions.	Functions of the lodge doctors.	Further enlightenment of the public (compliments, newspaper articles, lectures, congresses, etc.).
	2.	*Voluntary Notification by the Sick Person.*	Dispensaries for the examination and advising of tuberculous persons. Polyclinics. Medical hours of consultation for Tuberculous persons. Stations for observation.	Polyclinics in connection with universities. Their use as stations of observation for classifying patients.	Dispensaries and polyclinics in city hospitals. Their uses as stations of observation for classifying patients.	The increase in efficiency of sanatoriums in connection with insurance societies is an excellent means toward voluntary notification.	Rôle played by lodges in sanatorial nursing. Family nursing. Supply of pocket-spittoons, instructive pamphlets, etc.	Polyclinic arrangements (consulting hours for consumptives) in connection with the sick funds of the factory. Supply of spittoons.	Polyclinics in hospitals. Functions of Sisters of Charity in providing for private families.	Providing for private families. Concentration of the energy of clubs, lodges, etc. of the principal cause of family poverty. Supervision and support of patients.	Grants for the erection of polyclinics, etc. For free distribution of attractive pamphlets.
	3.	*The Visiting of Patients.*	Sanitary inspection of all workshop arrangements. Instruction by doctors and inspectors of trades. Nurses in municipal hospitals. Auditors of sick funds.	Inspection of boarding-houses in health resorts, private convalescent homes, etc. Inspection for industrial undertakings. Employment in nursing municipal patients. Contributions of the insurance societies.	School doctors, charity doctors, other organs for the care of the sick and orphans.	Health inspections of the insured (pension funds). Confidential doctors. Preventive measures. Assistance from sisters of Charity.	Supervision of lodge-patients in their homes (doctors, supervising officers).	Examination of apprentices and newcomers. Regular sanitary inspection of persons employed in inclosed rooms.	Medical inspection of the inmates of boarding-houses, etc.	Instruction in the club's method. Sisters of Charity in municipal nursing.	
Treatment in General Hospitals.	4.	*Nursing at Home.*	Consumptives who expectorate or cough harsh and who remain at home must have a separate room. Destruction of the disease germs by proper disinfection.	Promotion of the small-dwelling system. House police. Arrangement of plots of land. Model workmen's dwellings in connection with State workshops.	Free disinfection of houses. Modern reform of houses. Proper policy with regard to ground plots. Plans of cultivation. Building societies. Facilitation of traffic.	Cheap money for building societies.	Their rôle in inspection and supervision of dwellings.	Building of workmen's houses. For families with consumptives one room extra on an average for the isolation of the patient.	Charitable grants at a low rate of interest for cottages.	Assistance to families. Separate bucket, kitchen, pocket-spittoons and old clothes. Children's refuges. Schools of domestic economy. Children sent away for prevention. Help for the indigent.	Furtherance of the same.
	5.	*Hospitals.*	Tuberculous patients are to be isolated. Isolation rooms. Isolation stations. Isolation pavilions with arrangements for hygieno-dietetic treatment.	Model institutions in university clinics. Model arrangements in the army and navy lazarettes.	Completion of old hospitals. Suitable new buildings. In big cities, central hospitals for tuberculosis.	Their own hospitals, with special arrangements for tuberculosis.	Timely admission of sick persons to the hospitals.	In large factories, institutions of their own. Agreements with other hospitals.	Hospitals with arrangements for tuberculous patients.	All hospitals, etc., provided with tuberculosis stations.	Grants for the erection of such establishments.
	6.	*Convalescent Homes.*	For the better securing of permanent cures of all sorts of patients in the convalescent stage. Branches of the hospitals. In rustic surroundings cost less than hospitals.	Improvement of modern hospital buildings. Model State institutions. Convalescent homes as supplements to army and navy lazarettes.	Larger hospitals in the city need supplementing by convalescent homes.	Their own convalescent homes.	In centralizing their own convalescent homes. Discharge of convalescents.	For large factories, their own recuperative resorts. Transportation of convalescents to other institutions.	Building of convalescent homes supplementary to foundation hospitals.	Erection of convalescent homes.	
(B) Isolation of Diseased Persons.	7.	*Day Camps.*	In the environs of cities simple arrangements for the reception of temporary patients during the day, so that they may return home at night. Among such there are a great number of tuberculous patients. Infection in the open air out of the question.	Free gifts of fiscal forestland. Reduced railway fares.	Grants to poor children, for expenses in convalescent homes. Support of convalescents.	Grants for institution and management.	Regular transportation of convalescents with grant of money for dinner, milk, and traveling.	For large factories, their own recuperative resorts. Transportation of convalescents for short institutions.	Means for the erection and maintenance of such foundations. Indigent patients.	Management and maintenance after the method of the Red Cross. Help for the indigent.	Transportation facilities and pecuniary aid.
Treatment in Special Institutions for Tuberculous.	8	*Sanatoriums.*	The rest cure: (*a*) for adults, (*b*) for children. For patients in the incipient stages. Hygienic-dietetic methods of cure. Hygienic instruction and education.	Annual grant to the Central Committee against tuberculosis. Institutions for workmen in State workshops, railways, etc.) Gift of lands. Grants for sanatoriums.	For large towns, their own sanatoriums within easy distance. For children, if possible, sea hospices. Aids to obtaining free admission for the indigent.	Their own sanatoriums for insured persons. Regular transportation of consumptives. Support of families during the cure.	Timely removal of patients to the sanatoriums. First and foremost, the functions of providing for families.	In individual cases their own sanatoriums. Removal of sick persons to other institutions. Support of their families.	Their own sanatoriums best for middle classes.	Their own sanatoriums. In the first place children's sanatoriums. Raising money for the indigent. Assistance to families. Care of children.	Payment of the final expenses for recovered patients.
	9.	*Country Colonies.*	Employment cure for sanatorium patients after the rest cure. Institutions with systematic employment, principally in the open air. Transition to labor at regular callings. For children, school sanatoriums. Country education homes. Workmen's gardens.	Gift of forest lands at a moderate rent. Subvention.	In connection with their own sanatorium, despatch of indigent patients at the expense of the municipality. Municipal land for large families for gardening.	Country methods of cure in connection with their own sanatoriums.		Patients to be sent away before recommencing work. Situations to be reserved for patients during their cure. Distribution of lighter work to those in need of special care.	..	Country colonies, especially for children. School sanatoriums. Workmen's gardens.	Their subscription.
	10.	*Special Homes.*	Institution for patients in advanced stages for whom proper attention at home is impossible (see No. 4). Invalid homes. Asylums.	In connection with hospital arrangements. Stations for advanced arrangements of a family character. Pleasant surroundings, good nursing.	Their own retreats in connection with other hospital arrangements. Grant of expenses to the indigent.	Their own invalid homes. Transportation of patients. People of independent means to be recommended to other institutions.	..	Payment of maintenance expenses for advanced cases.	Sick homes in connection with charitable and religious institutions particularly effective.	Sick homes. Sick country conditions.	Assistance, especially of pensioned beds, and by provision.

und seine Unterstützung durch Anschauung sind in den Anstalten alle irgendwie erwünschten Hülfsmittel bereitzustellen.

9. Die Leitung von Lungenheilstätten ist einem tüchtigen, erfahrenen, mit sozial-hygienischen Spezialkenntnissen ausgerüsteten Arzte zu übertragen, dem alles übrige Anstaltspersonal unterstellt ist.

Ten Years' Experience in Sanatorium Work.—(PANNWITZ.)

Professor Pannwitz discusses: (1) His experience with regard to the construction and arrangement of sanatoriums; (2) his administrative experience; (3) the results of treatment; (4) the supplementary measures before and during sanatorium treatment; and, finally (5) his special experience in children's sanatoriums. The free sanatorium has developed into a special type among tuberculosis institutions, and its system cannot be replaced by any other. More than 100 free sanatoriums, with an average of 100 beds, are now in operation, and at the International Tuberculosis Conference at The Hague and in Vienna an agreement was reached with regard to the minimum hygienic requirements in the construction of free sanatoriums. The cost of erecting a normal free sanatorium need not exceed 4000 marks per bed. Special arrangements must be provided for carrying out the rest cure in bed.

As the result of several years' discussion, a new system for a uniform classification of the cases with respect to the stage of the disease has been reached and generally introduced under the name of the "Turban-Gerhardt's classification."

An important lesson, which has been learned by experience, is that the rest-cure in sanatorium must be followed by a period during which the convalescent engages in some light agricultural occupation (occupation-cure), so that he may again become accustomed to regular manual work and thus render the results of treatment more permanent.

The medical treatment, besides the general hygienic and dietetic measures, should include the use of tuberculin, administered with strict regard to the individual and with the greatest caution, so as to avoid producing any reaction. The results of the tuberculin treatment are becoming more and more satisfactory.

With regard to the questions of dividing the treatment into two parts, and the tuberculin treatment, the opinions of experts of special experience are included in the report.

The facts relating to running expenses, systematic hygienic education, and the medical and institutional personnel are also discussed. In the section on the Results of Treatment, recovery in the economic sense is defined in contradistinction to recovery in the pathological sense. Statistics from

various institutions bearing on the permanence of the results of treatment are quoted, as well as expert opinions by Freund of Berlin, Bielefeldt of Lübeck, and Rumpf of Baden-Baden, on the same subject. The most important adjuncts to the free sanatorium are the convalescent camps or homes, a general supervision of living conditions by social workers from the supporting dispensaries, the rendering of assistance to patients' families, and finding work for convalescents.

In relating his special experience in children's sanatoriums, the lecturer lays special stress on the educational feature. These institutions should be arranged on the simplest hygienic plan, in order to avoid getting the children accustomed to comforts which, for want of means, cannot be supplied in their own homes.

A sanatorium for children must have some farming facilities, so that, after the rest-cure of several weeks, the child may continue to live in the open air for some time and engage in gardening or other outdoor occupation, and thus render the results of treatment more permanent. In this way a good influence can be exerted in the choice of a suitable occupation, such as gardening or agricultural work for boys, and hygienic housekeeping for girls. Finally, as an example of systematic coöperation in the fight against tuberculosis, the lecturer gives a short description of the organization of the *Volksheilstätten-Verein vom Rothen Kreuz* (Red Cross Association of Free Sanatoriums), which was founded in 1895, and which called into being the sanatoriums of Grabowsee and Hohenlychen, and, in addition to a number of other improvements, established the first Supporting Dispensary (with social workers) (*Fürsorgestelle*) in 1896, and the first Convalescent Camp (*Erholungsstätte*) in 1900.

Dix Années de Sanatorium.—(Pannwitz.)

Le professeur docteur Pannwitz expose: (1) son expérience de la construction et de l'aménagement des sanatoriums; (2) son expérience administrative; (3) les résultats du traitement; (4) les mesures supplémentaires prises avant et pendant le traitement au sanatorium; (5) enfin, son expérience personnelle dans les sanatoriums d'enfants. Le Sanatorium Gratuit (*Volkssanitarium*) est devenu un genre spécial parmi les institutions pour tuberculeux et dont le système est unique. Plus de 100 sanatoriums gratuits, avec une moyenne de 100 lits, sont maintenant en pleine activité, et, au Congrès International de la Tuberculose à La Haye et à Vienne, on a déterminé le minimum des conditions hygiéniques requises dans la construction des sanatoriums gratuits. Le prix de construction d'un sanatorium gratuit peut être limité à 4000 marks par lit. Des dispositions particulières doivent être prises pour assurer la cure de repos au lit.

A la suite de discussions soutenues pendant plusieurs années aux Congrès Internationaux, on a établi un nouveau système pour la classification uniforme des cas suivant le degré de la maladie; il est généralement connu sous le nom de *Classification Turban-Gerhardt* (du degré de la maladie).

L'expérience a fourni cette importante leçon: après la cure de repos au sanatorium, le convalescent doit se livrer quelque temps à un léger travail d'agriculture (la *cure de travail*), afin de pouvoir s'habituer de nouveau à son métier ordinaire.

Le traitement médical, outre les mesures hygiéniques et diététiques ordinaires, doit comprendre l'emploi de la tuberculine, administrée avec le plus grand soin et suivant les besoins de l'individu, pour éviter de produire une réaction.

Nous discutons également les frais d'entretien, l'éducation hygiénique systématique, le personnel médical et administratif. Dans le chapitre sur les Résultats du Traitement, nous définissons la guérison au sens économique en la distinguant de la guérison au sens pathologique. Viennent ensuite des statistiques de diverses institutions sur la permanence des résultats du traitement et les avis experts de Freund, de Berlin; de Bielefeldt, de Lübeck; et de Rumpf, de Baden-Baden, sur le même sujet. Parmi les auxiliares les plus importants des sanatoriums gratuits il convient de citer les camps et maisons de convalescents, une surveillance générale des conditions d'existence par les agents des *dispensaires alimentaires*, l'assistance portée aux familles des malades et la recherche d'emplois pour les convalescents.

En racontant son expérience personnelle dans les Sanatoriums d'Enfants, l'auteur insiste particulièrement sur l'éducation. Ces institutions devraient être aménagées avec l'hygiéne la plus simple, pour ne pas habituer les enfants à un comfort que, faute de moyens, ils ne sauraient se procurer chez eux.

Un sanatorium pour enfants doit offrir quelques facilités pour la culture, de sorte qu'après une cure de repos de quelques semaines, le jeune convalescent puisse continuer à vivre au grand air un certain temps, se donner au jardinage ou à quelque autre travail extérieur, et par là mieux assurer la permanence des résultats du traitement.

Finalement, comme exemple de coöpération systématique dans la lutte contre la tuberculose, l'auteur décrit brièvement l'organisation du *Volksheilstätten-Verein vom Rothen Kreuz* (Association de la Croix Rouge des Sanatoriums Gratuits), fondée en 1895, et à laquelle nous devons les sanatoriums de Grabowsee et de Hohenlychen, sans parler de nombre d'améliorations, du premier Dispensaire Ailmentaire, avec agents extérieurs (*Fürsorgestelle*), établi en 1896, et du premier Camp de Convalescents (*Erholungsstätte*) établi en 1900.

THE VALUE OF SANATORIUM TREATMENT.

By Arthur Latham, M.D.,
London.

Some years ago I expressed the opinion that sanatoriums were essential to the successful treatment of pulmonary tuberculosis on a large scale, and that these institutions afforded invaluable aid to any campaign directed toward the eradication of the disease, provided they were used intelligently as an important link in a properly coördinated system of attack. After several years of increased experience I see no reason to withdraw this opinion, but, on the contrary, I am more convinced than ever of its truth.

The fact that this opinion does not meet with universal acceptance is due to several causes. In the first place, the majority of sanatoriums are inefficient. Many of these institutions are mere hotels run for profit, and do not provide the discipline and constant medical supervision which are so essential to success. The value of a sanatorium depends on the man at its head, and no sanatorium, in my experience, is efficient when the head of it resides at a distance, or has his powers and discretion fettered by either a lay or a medical committee. Much of the criticism leveled against sanatorium treatment is, in consequence, due to the fact that the erroneous deduction has been made that because certain sanatoriums fail to give good results, therefore sanatorium treatment is a failure.

The second reason why the value of sanatorium treatment does not meet with universal acceptance is the fact that sanatoriums have been regarded in some quarters as sufficient in themselves, and sanatorium treatment as a certain cure for every case of consumption. No level-headed man would ever have regarded sanatorium treatment in this light. It is clear that a sanatorium is a link in a comparatively long chain, and that unless it forms a part of a carefully thought-out system, embracing, among other things, dispensaries, hospitals, homes for the dying and advanced cases, careful disinfection, and after-care when the sanatorium is left, together with assistance to the bread-winner's family when he is at the sanatorium, it cannot bring about the eradication of tuberculosis. Those who have taught the public to regard sanatorium treatment as a specific cure for all stages and forms of pulmonary tuberculosis will be, and in fact have already been, discredited; but, what is of more importance, sanatorium treatment has to

a certain extent fallen into disrepute among the less intelligent members of the public, owing to this teaching. Sanatorium treatment does not cure all forms of pulmonary tuberculosis, and no form of treatment ever will cure all cases of advanced and long-standing disease. Is it fair to condemn sanatorium treatment because it cannot accomplish the impossible? Again, if a workingman in an early stage of consumption is sent to an efficient sanatorium, there is every prospect of the disease being arrested; but if he is allowed to return to precisely those conditions under which he contracted the disease,—too hard work, bad air, insufficient food,—the disease will almost certainly return. Is it fair when this happens to say that sanatorium treatment is of no avail?

The third reason why sanatorium treatment does not meet with universal acceptance is due to the fact that the erection and the maintenance of sanatoriums have cost too much. The erection of costly palaces for the treatment of consumption in the past is a standing monument to the possibilities of human folly. Fortunately, this wasteful expenditure of money is now a thing of the past. Mr. A. William West (architect) has shown that it is possible to erect an efficient and comfortable sanatorium for 200 persons at a total cost, for erecting and equipment (apart from the cost of land), of £100 a bed. It may be mentioned, in order to show the durability of the construction, that, in this sanatorium—the Benenden Sanatorium, for members of the working classes—the floors and doors are made of teak. The building of a sanatorium at a reasonable price has been accomplished by Mr. West by means of a special steel-girder construction which does away with the necessity for expensive foundations, and makes it possible for the larger part of the labor to be carried out by unskilled workmen. Again, Dr. Paterson has shown that it is possible to conduct the Brompton Hospital Sanatorium at Frimley at a cost of 25 shillings per week per patient for maintenance and administration. This has been accomplished largely by his system of graduated labor, by means of which the greater part of the labor necessary for the up-keep and cleaning of the sanatorium is carried out by the patients themselves, with marked benefit to their health.

The fourth reason why the value of sanatorium treatment does not meet with universal acceptance is due to the fact that it is held by many that it is impossible to provide the necessary funds to pay for the treatment of the majority of sufferers. The German insurance system has shown the inadequacy of this argument. Again, Mr. C. H. Garland has organized a fund among the employees of the British post-office which meets the cost of sanatorium treatment, for all those employees who contract consumption, at an individual weekly contribution of one halfpenny a week, which is deducted at headquarters from their wages. It is interesting to note that nearly 40,000 post-office employees are contributing to this scheme. There is no

reason why a scheme of this kind should not be in existence among all skilled workmen.

The final objection to the value of sanatorium treatment is the difficulty in making arrangements for maintaining the family when the bread-winner is away at the sanatorium, and in finding suitable work for him on his return. The German government has solved this problem, and other countries can do the same. The employees of the British post-office who contribute to the scheme outlined above receive full pay from the government for six months when away at a sanatorium, for the provision of their wives and families. At the Brompton Hospital the "lady almoner" supplies the necessary link between the patient and his employer, the clergy, and the various charitable bodies, and in this way the needs of his wife and family are met without much difficulty. Dr. Paterson's system of graduated labor has shown that it is possible to treat a man in such a way that the muscles used in his ordinary work are kept trained, and the patient is enabled to resume his previous occupation immediately after his discharge from the sanatorium.

The best proof of the value of sanatorium treatment is obtained from a study of the results of treatment before and after the adoption of sanatorium methods. Dr. J. E. Pollock published in 1865 the results of treatment in 3566 cases of consumption, in all stages, which had been observed by himself. The average duration of life of all these cases, from the first symptom of the disease to the fatal termination, was two and a half years. Dr. Pollock further found that no less than 83 per cent. of the patients whom he saw in the early stage of the disease died within five years of their first symptom. Sanatorium treatment has completely altered this grim picture. Thus, in 1905 no less than 57 per cent. of the patients who were treated in 1900 in the Prussian and Hessian State railway sanatoriums were capable of full work. We see, then, that before the advent of sanatorium treatment 83 per cent. of patients in an early stage died at the end of five years, and that after the advent of sanatorium treatment 57 per cent. of patients remained in full enjoyment of their working capacity at the end of five years.

More recent statistics tell the same tale, and also show that by combining sanatorium treatment with tuberculin treatment still better results can be obtained, while the percentage of relapses is still further diminished. Thus, Dr. Ritter, of the Hamburg Heilstätte Edmundsthal, has found that patients who had been treated at the sanatorium by sanatorium methods alone showed the following capacity for full work three years after their discharge from the sanatorium, viz.:

Patients treated in the first stage of their disease.....72% at work.
Patients treated in the second stage of their disease.....57% at work.
Patients treated in the third stage of their disease.....22% at work.

Patients who had been treated at the sanatorium by sanatorium methods, together with tuberculin, showed the following capacity for full work three years after their discharge from the sanatorium:

Patients treated in the first stage of their disease.....95% at work.
Patients treated in the second stage of their disease.....82% at work.
Patients treated in the third stage of their disease.....50% at work.

No criticism can ever overcome the force of these statistics; but the value of sanatorium treatment is not confined to the immediate effects produced on the patients. One of its greatest features is its educational value. Sanatorium treatment has done more than anything else to awaken the public to the necessity of living under hygienic conditions. This is partly due to the notice taken by the public press of the movement, and is partly due to the fact that every patient who leaves a sanatorium acts as a missionary and preaches the value of hygienic living and the necessity of preventing the spread of infection.

The value of sanatorium treatment has been enhanced by recent additions to our knowledge. We have known for many years that the continuous supply of fresh air, good hygienic conditions, and a nutritious diet increased the resisting capacity of the tissues to the inroads of the tubercle bacillus. We have also known for many years that the success of sanatorium treatment depended largely on the regulation of the amount of rest and exercise prescribed for each patient. We did not understand exactly how exercise did good, nor why in many instances it did harm. Dr. A. C. Inman, by his study of the opsonic index of the patients performing the different grades of labor prescribed for them by Dr. Paterson at the Frimley Sanatorium, has given us an explanation of the meaning of sanatorium treatment, which is at once reasonable and scientific. This explanation shows clearly that the reaction of a patient to the disease depends very largely upon the question whether the amount of tuberculin absorbed from the diseased focus is beyond the immunizing capacity of the body or not. Excessive absorption, *i. e.*, excessive autoinoculation, means steady progress of the disease, accompanied by fever. The amount of this absorption, or autoinoculation, depends very much on the amount of movement permitted. If the amount of autoinoculation is sufficient and not too great, the body tissues are stimulated and opsonins and other defensive bodies are manufactured. After a time the tissues fail to respond to this stimulus, and consequently a larger stimulus is required. This larger stimulus is produced by increasing the exercise, which increases the absorption of the tuberculous products; and here we have the secret of the success of those sanatoriums in which the patients do better than the patients of other sanatoriums, simply because they are gradually educated to walk as far as 20 miles a day, and are not considered to have reached a satisfactory condition when only 5 or 6 miles

a day have been accomplished. Here, also, we have the explanation of the success of Dr. Paterson's scheme of graduated labor. Too large a stimulus, *i. e.*, excessive autoinoculation, renders the body tissues incapable of response. Such a stimulus is due to excessive movement and can only be met by rest. We see, therefore, that the decision as to the amount of exercise or movement permitted to an individual patient requires great judgment and discretion. It is obvious that this question cannot be decided correctly except by means of constant medical supervision. This constant attention to every detail, and especially to the amount of movement permitted, is the key to the success of sanatorium treatment.

It is clear that it is possible to give a patient sanatorium treatment without sending him to a sanatorium. Most patients, however, are more likely to carry out the treatment in every detail if they are in an institution entirely given up to this purpose, for it is hard to make patients understand the importance of continuously carrying out all the directions given, unless they are first sent to school to learn how to get well. At the same time patients of strong character, who have the necessary home facilities, and who intend to get well, can benefit almost, if not quite, to the same extent if they have the treatment under close medical supervision at their own homes.

Valor del Tratamiento de Sanatorio.—(LATHAM.)

Los sanatorios son esenciales para el tratamiento con éxito de la tuberculosis pulmonar en gran escala, y son esenciales en cualquier proyecto que se encamine á destruir la enfermedad, con tal que se usen intelligentemente como un importante eslabon en un propiamente coördinado sistema de ataque.

El valor de los sanatorios no tiene universal aceptación por varias razones:

1. La mayoría de los sanatorios son ineficaces.

2. Los sanatorios han sido considerados por algunos como suficientes por sí mismos y como cura cierta de casi todos los casos de consunción.

3. La construcción y mantenimiento de los sanatorios son muy costosos.

4. Se cree por muchos que es impossible proveer los fondos necesarios para pagar para el tratamiento de la mayoría de los pacientes.

5. La dificultad de hacer arreglos para mantener la familia cuando el que gana el pan está en el Sanatorio, y la de encontrar trabajo á propósito para ésta cuando regresa á su hogar.

La major prueba del valor del tratamiento de los sanatorios se obtiene del estudio de los resultados del tratamiento de la consunsión antes y desbues de la adopción del Sanatorio y su método. He aquí estadísticas.

El valor de los métodos de Sanatorio se aumenta grandemente con el uso de la tuberculina.

El tratamiento de Sanatorio es de gran valor desde un punto de vista educacional.

El valor del tratamiento de Sanatorio ha sido exagerado por el reciente aumento de nuestros conocimientos, y más especialmente con respecto á la auto-inoculatión y como corresponde el cuerpo á la tuberculina.

Über den Wert der Behandlung in einer Heilanstalt.—(LATHAM.)

Heilanstalten sind unentbehrlich bei der erfolgreichen Behandlung von der Lungentuberkulose in einem grossen Masse, und sie sind unentbehrlich bei irgend einem Plan der sich auf die Ausrottung der Krankheit richtet, vorausgesehen, dass sie verstandesmässig gebraucht werden als wichtiges Kettenglied in einem richtig co-ordiniertem Angriffssystem.

Der Wert der Heilanstalten trifft nicht allgemeine Annahme aus verschiedenen Gründen.

1. Die Mehrzahl der Heilanstalten ist nicht zweckerfüllend.

2. Heilanstalten sind von manchen als an und für sich genügend angesehen worden und als ohne Zweifel heilungbringend in beinahe jedem Falle der Schwindsucht (Tuberkulose).

3. Der Bau und die Erhaltung von Heilanstalten kosten zu viel.

4. Es wird von Manchen behauptet, dass es unmöglich ist, die nötigen Geldsummen zu bekommen um die Kosten der Behandlung von der Mehrzahl der Leidenden zu bezahlen.

5. Die Schwierigkeit bei den zutreffenden Einrichtungen für die Erhaltung der Familie während der Broterwerber in der Heilanstalt sich befindet, und die Schwierigkeit, ihm bei seiner Heimkehr passende Arbeit zu finden.

Der beste Beweis für den Wert der Heilanstaltsbehandlung wird erhalten durch das Studium der Resultate von der Behandlung der Tuberkulose vor und nach der Annahme dieser Behandlung. (Hier folgen Zahlenangaben.)

Der Wert der Heilanstaltsmethoden wird sehr erhöht durch die Anwendung des Tuberkulins.

Die Heilanstaltsbehandlung ist vom grossen Wert von dem Standpunkt der Bildung. Der Wert der Heilanstaltsbehandlung ist vergrössert worden durch die neueren Hinzufügungen zu unserem Wissen und im besonderen in Bezug auf die Auto-Impfung (auto-inoculation) und die entsprechende Wirkung des Tuberkulins in dem Körper.

KOSTEN DES BAUES UND DER UNTERHALTUNG VON LUNGENHEILSTÄTTEN.

Von Dr. Richard Freund,
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I. Als auf der Internationalen Tuberkulose-Konferenz im Haag die Frage erörtert wurde: "Was dürfen Heilstätten kosten?" habe ich darauf hingewiesen, dass die Frage in dieser Form nicht gestellt werden könne, weil der Kostenbetrag für eine Heilstätte von den verschiedensten Umständen abhängig ist, welche mit dem Wesen der Heilstätte an sich nichts zu tun haben. Die Frage müsste vielmehr so gestellt werden: "Welche Mindestanforderungen müssen an eine Heilstätte gestellt werden?" Die Kosten des Baues einer Heilstätte sind, wie dies schon wiederholt angeführt wurde, abhängig von den Kosten des Grund und Bodens. Dieser Grund und Boden kann, wenn er sich in der Nähe einer Grossstadt befindet, sehr teuer, er kann, wenn er sich in einem ländlichen Bezirke befindet, sehr wohlfeil sein. Des weiteren kommt es darauf an, wie hoch in dem betreffenden Bezirke und während der Bauzeit die Löhne und wie hoch die Preise der Materialien sind. Auch die Frage der Schaffung von Zufahrtsstrassen für entlegenere Heilstätten oder für solche Heilstätten, welche in schwierigem Gelände, im Gebirge liegen, kommt hier in Betracht. Wenn man die Frage nach den Mindestanforderungen an eine Heilstätte beantworten will, so kommt es vor allem darauf an, *den Begriff der Heilstätte als solcher klarzustellen.*

Ich habe von jeher darauf hingewiesen, dass den Heilstätten die sehr wichtige Aufgabe der hygienischen Volkserziehung zufällt. Der Arbeiter, der längere Zeit in einer Heilstätte lebt, lernt erst dort, was es heisst, hygienisch richtig zu leben; er gewöhnt sich an Sauberkeit und lernt die Vorteile einer rationellen Lebensweise in frischer Luft kennen. Kommt er in seine häuslichen Verhältnisse zurück, so ist er bemüht, nach Möglichkeit das in der Heilstätte gewohnte Leben fortzusetzen und dringt namentlich in Bezug auf Sauberkeit, frische Luft und Ernährung auf zweckentsprechende Aenderung der bisherigen Lebensweise. Seine Erfahrung teilt er Freunden und Bekannten mit und wird so zum Apostel für eine hygienische Lebensweise. Dieser Zweck der Heilstätten kann aber und darf nicht der Hauptzweck sein. Der Hauptzweck der Heilstätte muss der sein: *die Heilung von Lungenkranken.* Ist aber die Heilung der Hauptzweck, so müssen sich die Heil-

stätten, welche ihre Aufgaben erfüllen sollen, mit der Zeit zu *Spezialkrankenhäusern für Lungenkranke ausbilden.*

Im Laufe der Jahre hat sich ergeben, dass im Kampfe gegen die Tuberkulose nicht einzig und allein die Heilstätten in Betracht kommen, sondern dass ihnen ergänzend eine Reihe anderer Einrichtungen zur Seite stehen müssen, nämlich vor allem die Auskunfts- und Fürsorgestellen und die Walderholungsstätten. Diese beiden Einrichtungen sind dazu bestimmt, die Heilstätten von allem ungeeigneten Material zu entlasten und ihnen nur diejenigen Kranken zuzuweisen, welche wirklich einer Heilstättenbehandlung bedürfen. Wenn in einem Bezirk für die Tuberkulosebekämpfung neben den Heilstätten diese anderen Einrichtungen zur Verfügung stehen, so muss dann auch die Heilstätte so gestaltet werden, dass sie ihrem einzigen Zweck vollkommen genügen kann. Es ergibt sich dann von selbst, dass an die Heilstätten höhere Anforderungen gestellt werden müssen, als sie vielleicht in früherer Zeit gestellt wurden, wo sie tatsächlich mehr den Charakter von Erholungsstätten hatten.

Der Zweck der hygienischen Erziehung und einer rationellen Lebensweise in frischer Luft bei guter Ernährung kann auch in den Walderholungsstätten erzielt werden; dazu brauchte man keine Lungenheilstätten. Lungenheilstätten, welche ihren Zweck erfüllen sollen, müssen allen Anforderungen genügen, welche man an ein derartiges *Spezialkrankenhaus* stellen muss.

In dieser Definierung des Charakters der Heilstätten liegt auch, dass die Heilstätten nicht nur vorübergehend während eines Teiles des Jahres—d. h. in der wärmeren Jahreszeit—ihre Aufgaben erfüllen, sondern dass sie während des ganzen Jahres den Kranken zur Verfügung stehen. Es wäre auch unwirtschaftlich, eine Heilstätte so zu organisieren, dass sie nur für einen Teil des Jahres ihre Aufgaben erfüllen kann. Soll aber die Heilstätte auch im Winter für eine volle Belegung geeignet sein, so muss selbstverständlich der Bau der Heilstätte dementsprechend ausgestaltet werden. Es sind demnach vor allem erforderlich: massive Baulichkeiten, die den Aufenthalt auch im Winter für den Kranken zu einem behaglichen machen können. Des weiteren sind alle Massnahmen zu treffen, welche die Durchführung der peinlichsten Sauberkeit ermöglichen. Diese Forderung ist umso dringender und muss umso gewissenhafter durchgeführt werden, je grösser die Heilstätte ist, je grösser die Gefahr der Unsauberkeit und je grösser damit die Gefahr der Ansteckung ist. Durch Verwendung von Kacheln, Fliesen und glasierten Steinen kann diese Sauberkeit in hohem Masse erzielt werden. Die Verwendung derartigen Materials geschieht in England in umfangreichem Masse und ist auch in den grossen Heilstätten der Landes-Versicherungsanstalt Berlin bei Beelitz im umfangreichsten Masse durchgeführt. Die Kosten der Verwendung derartigen Materials sind allerdings sehr erheblich. Sie machen sich aber sehr bezahlt sowohl

dadurch, dass der Zweck der Sauberkeit im vollkommensten Masse erreicht wird, als auch dadurch, dass Erneuerungen und Reparaturen an Wänden und Fussböden auf das Mindestmass zurückgeführt sind.

Des weiteren muss die Heilstätte zentrale, gut funktionierende Anlagen für Heizung, Beleuchtung, Ent- und Bewässerung erhalten. Was die Heizung anlangt, so muss die Erwärmung zur Vermeidung von allzu trockener Luft mit heissem Wasser erfolgen. Die Beleuchtung wird am besten, wo es irgend möglich ist, mittels elektrischem Licht erfolgen. Es müssen des weiteren schallsichere Decken bezw. Fussböden geschaffen werden, damit störende Geräusche in der Heilstätte möglichst herabgemindert werden. Es dürfen für die Kranken keine grossen Schlafsäle geschaffen werden, es muss vielmehr die Zahl der Betten für ein Zimmer auf höchstens 6 bis 8 beschränkt werden. Es müssen ferner Einzelzimmer und Zimmer für 2 Betten in grösserer Anzahl vorhanden sein, damit schwerere Kranke in geeigneter Weise untergebracht werden können. Der Luftraum für jeden Kranken muss möglichst gross bemessen sein, weil ja der Heilfaktor "Luft" gerade in den Lungenheilstätten eine grosse Rolle spielt. Erwünscht ist die Schaffung von Anlagen für Kaltwasserbehandlung, notwendig die Anlegung eines Röntgenkabinets und die Schaffung von Anlagen für eine gründliche Desinfektion von Wäsche, Kleidungsstücken, Sputumflaschen u. s. w. Die Anlegung von Liegehallen erscheint selbstverständlich. Auch muss in der Heilstätte selbst für genügende Aufenthaltsräume, sogenannte Tagesräume, gesorgt werden, für die, wie die Erfahrung lehrt, besonders im Winter ein grosses Bedürfnis vorhanden ist.

Jeglicher Luxus ist in den Heilstätten zu vermeiden; insbesondere gilt dies von der Ausstattung der Krankenzimmer selbst. So sind auch die Krankenzimmer der Heilstätten Beelitz in der denkbar einfachsten Weise ausgestattet. Das Inventar besteht lediglich aus einer eisernen Bettstelle, einem Stuhl, einem Nachttisch und einem Schrank.

Allgemein muss für den Bau einer Heilstätte der Grundsatz gelten: Verwendung der besten Materialien, Ausführung aller Installationsarbeiten in vorzüglichster Weise. Bei Befolgung dieses Grundsatzes stellen sich allerdings die Anlagekosten höher. Aber diese erhöhten Kosten werden voll ausgeglichen durch die wesentliche Herabminderung von Reparaturen und Erneuerungen. Abgesehen davon aber, dass diese Reparaturen und Erneuerungen bei mangelhafter Ausführung und mangelhaftem Material sehr erhebliche Kosten verursachen, wird durch die Notwendigkeit solcher Arbeiten der Betrieb der Heilstätte in der empfindlichsten Weise fortdauernd gestört und unter Umständen, z.B. bei mangelhafter Funktionierung der Heizungsanlagen oder der Bewässerung, ganz zur Unmöglichkeit gemacht.

Der von mir wiederholt aufgestellte Grundsatz, *das Teuerste ist das*

Lfde. Nr.	Landes-Versicherungsanstalt oder Kassen-Einrichtung.	Namen der Heilstätte.	Bettenzahl für Männer.	Bettenzahl für Frauen.	Bis einschliesslich zum Jahre.	Grösse ha.	Grösse a.	Grösse qm.	Kosten des Grund und Bodens. M.	Kosten des Baues. M.	Kosten der Einrichtung. M.	Gesamtkosten aus Spalte 8–10. M.	Gesamtkosten pro Bett. M.	Bemerkungen.
1.	2.	3.	4.	5.	6.	7.			8.	9.	10.	11.	12.	13.
1.	Landes-Versicherungsanstalt Berlin	{ Beelitz (Merck) für Männer / Beelitz (Merck) für Frauen }	729	471	1. 1. 1908	140	..	..	402.471	15.227.700	933.465	16.563.636	13.803	*Zu lfd. Nr.* 1: Die Zahlen für die Heilstätten Beelitz beziehen sich sowohl auf die Lungenheilstätten als auch auf die Sanatorien für andere Kranken.
2.	Landes-Versicherungsanstalt Brandenburg	Cottbus	..	110	1906	16	40	48	94.066	540.236	169.317	803.619	7.306	
3.	Landes-Versicherungsanstalt Posen	Kronprinz Wilhelm Volksheilstätte bei Obornik	100	..	1906	13	61	26	38.086	568.059	67.544	673.689	6.737	Für lungenkranke Männer sind rt. 600 Betten.
4.	Landes-Versicherungsanstalt Sachsen-Anhalt	Schielb (Harz)	127	..	1906	29	99	67	105.094	790.797	73.494	969.385	7.633	Für lungenkranke Frauen sind rt. 250 Betten.
		Königsberg bei Goslar (Harz)	70	..	1906	7	32	58	17.200	214.600	52.100	283.900	4.056	
5.	Landes-Versicherungsanstalt Hannover	Erbprinzentanne bei Zellerfeld (Harz)	..	63	1906	14	68	33	47.200	226.800	62.000	336.000	5.333	Für männliche andere Kranke und für weibliche andere Kranke 116 Betten.
		Schwarzenbach bei Clausthal (Harz)	70	..	1906	4	78	75	12.000	189.600	51.200	252.800	3.611	
		Stuberkshorn bei Soltau	65	..	1906	25	97	78	Pachtung	175.600	72.700	..	..	Die Kosten des Baues umschliessen auch den Erweiterungsbau der im Laufe des Jahres 1907 eröffneten Lungenheilstätte.
		Andreassheim bei St. Andreasberg (Harz)	..	43	1906	12	07	70	Pachtung	32.500	33.500	..	..	
6.	Versicherungsanstalt für Schwaben und Neuburg	Noch unbekannt	..	..	1906	27	25	97	79.863	2.372	..	..	..	
7.	Landes-Versicherungsanstalt Königreich Sachsen	Hochwald bei Neustadt i-Sa.	bis 260	..	1906	22	64	44	71.625	1.856.138	164.201	2.091.964	8.046	
8.	Landes-Versicherungsanstalt Württemberg	Wilhelmsheim bei Oppenweiler, O.-A. Backnang	177	..	1906	6	24	74	28.750	994.207	115.269	1.138.226	6.431	Beim völligen Ausbau der Heilstätte wird der Betrag pro Bett auf ca. 10,000 Mark heruntergehen.
9.	Landes-Versicherungsanstalt Baden	Friedrichsheim bei Marzell, Amt Mühlheim	170	..	1906	21	82	93	26.571	1.323.288	135.207	1.485.066	8.736	Noch nicht eröffnet.
		Luisenheim bei Marzell, Amt Mühlheim	..	140	1906	15	26	85	59.946	909.848	86.602	1.056.396	7.546	
10.	Landes-Versicherungsanstalt Grossherzogtum Hessen	Ernst Ludwigs Heilstätte bei Sandbach { im Sommer / im Winter }	122 / 106	..	1906	11	09	08	61.287	1.117.484	174.901	1.353.672	11.874	
11.	Thüringische Landes-Versicherungsanstalt	Römhild	..	80 bis 100 bei Aufstellung von Baracken.	1906	3	31	44	5.101	435.421	44.307	484.829	6.060	
12.	Landes-Versicherungsanstalt Braunschweig	Albrechtshaus bei Stiege	86	..	1906	1	46	08	Pacht 75.61 jährlich	185.735	32.269	..	..	
		Marienheim bei Stiege	..	36	1906	..	64	57	Pacht 29.05 jährlich	85.650	15.199	..	..	
13.	Landes-Versicherungsanstalt der Hansastädte	Oderberg bei St. Andreasberg (Harz)	114	..	1906	51	32	19	45.381	772.680	102.918	920.979	8.079	
		Glückauf in St. Andreasberg (Harz)	..	100	1906	4	60	10	17.492	563.289	61.575	642.356	6.424	
14.	Landes-Versicherungsanstalt Elsass-Lothringen	Leopoldinenheim in Altweier	..	70	1906	4	16	40	60.000	203.931	40.008	303.939	4.342	
15.	Pensionskasse für die Arbeiter der Preussisch-Hessischen Eisenbahngemeinschaft	Ober-Elsass, Stadtwald bei Melsungen	120	..	1906	17	05	62	71.941	903.832	107.024	1.082.797	9.023	
	Dieselbe	Moltkefels bei Niederschreiberhau (Riesengebirge)	100	..	1906	21	54	36	71.151	749.416	102.912	923.479	9.235	
16.	Norddeutsche Knappschafts-Pensionskasse	Knappschaftsheilstätte Sülzhein bei Ellrich	130	..	1906	9	..	76	28.920	828.387	70.000	927.307	7.133	
17.	Arbeiter-Pensionskasse für die Badischen Staatseisenbahnen und Salinen	Friedrich Hilda-Genesungsheim bei Oberweiler	..	..	1906	4	85	65	31.624	111.699	..	..	..	Eröffnung voraussichtlich Oktober 1907.
18.	Allgemeiner Knappschafts-Verein zu Bochum	Augusta Viktoria Knappschaftsheilstätte in Beringhausen bei Meschede i. W.	118	..	1906	169	99	31	60.000	1.900.095	106.059	2.066.154	17.510	

Billigste, hat sich gerade bei dem Bau der Heilstätten Beelitz glänzend bewährt.

Ueber die tatsächlichen Kosten der deutschen Lungenheilstätten gibt beigefügte Zusammenstellung ein Bild.

II. Was die Kosten der *Unterhaltung der Heilstätten* anlangt, so lassen sich auch hierfür keine Normal-Kostensätze angeben. Auch die Kosten der Unterhaltung hängen von den verschiedensten Umständen ab, welche mit der Heilstätte an sich nichts zu tun haben. Ist eine Heilstätte isoliert gelegen, so ergeben sich Aufwendungen, welche bei einer Heilstätte in der Nähe von grösseren Ortschaften in Wegfall kommen. So waren z. B. die Beelitzer Heilstätten genötigt zur Schaffung eines eigenen elektrischen Werkes für die Beleuchtung, einer eigenen Kanalisationsanlage nebst dem Rieselfeld, eines eigenen Wasserwerkes, zur Errichtung von Wohnhäusern für verheiratete Beamte und Angestellte, zur Erbauung eines Gotteshauses, zur Errichtung einer eigenen Bäckerei und Fleischerei, ja selbst zur Errichtung eines Dienstgebäudes für die Reichspost. Alle diese Anlagen waren unumgänglich notwendig und werden sich noch im Laufe der Jahre weiter vergrössern und vermehren. Die Verzinsung und die laufende Unterhaltung dieser Anlagen bedingt natürlich einen höheren Satz. Was aber die eigentliche Verpflegung anlangt, so wird gerade bei Anstalten mit grosser Bettenzahl dieser Kostensatz selbst bei Verwendung von besten Qualitäten sehr heruntergedrückt werden können durch Schaffung geeigneter Anlagen. Bei Einrichtung von eigenen Bäckereien und Fleischereien wird kaum eine Ersparnis erzielt werden, dagegen wird durch solche Anlagen die Qualität der gelieferten Lebensmittel bei Aufrechterhaltung der früheren Einkaufspreise erheblich verbessert. Eine Verbilligung kann erfolgen, wenn eine grössere Anstalt dazu übergeht, das Rohmaterial selbst zu liefern, z. B. durch Einrichtung von Schweinemästereien, von Schweinezüchtereien, durch den Anbau von Gemüse, Obst und Feldfrüchten, durch Schaffung eines Hühnerhofes u. s. w. Als erstrebenswerte Aufgabe müsste für eine grössere Heilstätte angesehen werden: die Schaffung eines grösseren landwirtschaftlichen Betriebes in der Nähe der Heilstätte, durch welchen die ganze Heilstätte mit Lebensmitteln versorgt werden kann.

Ueber die Kostensätze für die *reine Verpflegung* bei den deutschen Heilstätten gibt die umstehende Tabelle Aufschluss:

Die Gesamtkosten der Anstaltspflege pro Kopf und Tag bei den deutschen Heilstätten sind in der Tabelle auf Seite 883 und 884 angegeben.

Lfde. Nr.	Namen der der betreffenden Anstalt gehörigen Heilstätten.	Verpflegungssatz. M.	Pf.	Bemerkungen.
1.	Augusta Viktoria Knappschafts-Heilstätte	3	083	Unter Hinzurechnung des Personals beträgt der Pflegesatz 2.317 M.
2.	Schielo (Ostharz)	3	34	Am 1 : 12 : 07.
3.	(a) Lungenheilanstalt Tannenberg	2	32	Im Jahre 1906.
	(b) Desgl. Leopoldinenheim	2	01	
4.	(a) Heilstätte Friedrichsheim.	2	308	Im Jahre 1906. Für 1907 kann noch nicht angegeben werden.
	(b) Heilstätte Luisenheim	1	481	
5.	(a) Heilstätte Oderberg (Männer)	2	10	Incl. Personal 1.75 M.
	(b) Genesungsheim Westerland (Frauen)	1	65	" " 1.40 "
	(c) Heilstätte Glückauf (Frauen)	1	45	" " 1.25 "
	(d) Genesungsheim Gr. Hansdorf (Frauen)	1	40	" " 1.20 "
				nach dem Voranschlag für 1907.
6.	Lungenheilanstalt Friedrich-Hilda-Genesungsheim bei Oberweiler	2	058	Für Monat November 1907. Seit 1 : 10 : 07 eröffnet, erst zu $\frac{2}{3}$ belegt.
7.	Sülzhayn	1	93	Im Jahre 1906.
8.	Grabowsee	1	88	Bringt man die Verpflegungskosten des Personals in Abrechnung, beträgt der Satz 1.627 M.
9.	Genesungshaus:			
	(a) Stübeckshorn (Männer)	1	87	1.50 M.
	(b) Schwarzenbach (Männer)	1	57	1.31 "
	(c) Königsberg (Männer)	1	43	1.19 "
	(d) Erbprinzentanne (Frauen)	1	15	0.96 "
	(e) Friedrichshöhe (Frauen)	1	07	0.90 "
	(f) Andreasheim (Frauen)	1	06	0.89 "
				Bei Berechnung der überhaupt Verpflegten.
10.	Braunschweig	1	80	Annahme, der Berechnung jetzt nicht möglich.
11.	(a) Stadtwald bei Melsungen	1	78	.....
	(b) Moltkefels in Niederschreiberhau	1	69	.....
12.	(a) Lungenheilstätte Wilhelmsheim	1	74	Im Jahre 1906, der Aufwand für 1907 wird sich in den gleichen Grenzen halten.
	(b) Genesungsheim Bad Rötenbach	1	32	
	(c) Krankenheim Wildbach	1	37	
	(d) Genesungsheim Lorch	1	24	
13.	Tageserholungsstätte	1	73	Eine Heilstätte besitzt die Anstalt zur Zeit nicht.
14.	Belzig	1 2	63 26	Bis in der verflossenen Woche.
15.	Kronprinz Wilhelm Volksheilstätte bei Obornik	1	6.227	Im November 1907.
16.	(a) Ernst Ludwig Heilstätte	1	56	.....
	(b) Eleonoren-Heilstätte	1	21	.....
17.	(a) Lungenheilstätte Beelitz	1	509	Im November 1907 für Pfleglinge.
	(b) Sanatorium Beelitz	1	416	Personal zusammen 1.515 bzw. 1.460 M.

Lfde. Nr.	Namen der der betreffenden Anstalt gehörigen Heilstätten.	Verpflegungssatz. M.	Pf.	Bemerkungen.
18.	Heilstätte Hohwald	1	494	Ende Oktober, einschliesslich des Personals. Wird der Gesamtaufwand für Beköstigung incl. Personal auf einen versicherten Verpflegstag bezogen, beträgt der Satz 1.842 M.
19.	Oldenburg	1	47	Im Jahre 1906. Die Zubereitung für Speisen und Getränke ist nicht mit eingezogen. Unter Hinzurechnung des Personals 0.999 M. Für 1907 voraussichtlich etwas niedriger.
20.	(a) Genesungsheim Cauzigsee (Männer)	1	32	Einschliesslich eines Personals von 7 Personen.
	(b) Desgl. Waldfriede (Frauen)	0	95	Im Oktober 1906 eröffnet.
21.	Lungenheilstätte bei Rönchild (für weibliche Versicherte)	1	32	Im Jahre 1906. Für das Jahr 1907 noch nicht sichergestellt.
22.	Lungenheilstätte Cottbus	1	30	Im Jahre 1906. In den Etat für 1907 sind 1.33 M. eingestellt; dieser Satz ist auch für 1908 vorgesehen.
23.	Genesungsheim Kulmbach	1	19	Für 1906. Im Jahre 1907 voraussichtlich 11.7–1.18 M.
24.	Erholungsheim	1	16	Im Jahre 1906. Für 1907 lässt sich der Verpflegungssatz erst nach Schluss des Rechnungsjahres feststellen.
25.	(a) Krankenhaus in Breslau	..	80	Im Jahre 1906. Die Berechnung für 1907 kann nicht angegeben werden.
	(b) Genesungsheim für Männer in Hohenwiese ier R.	1	12	
	(c) Desgl. für Frauen in Schmiedeberg	1	02	.....
26.	Schwaben	..	..	Besitzt noch keine Heilstätte im Betriebe.

Lfde. Nr.	Namen der Heilstätte.	Gesamtkosten der Anstaltspflege pro Kopf und Tag.	Bemerkungen.
1.	Marienheim bei Stiege	2.90	pro 1906.
2.	Erbprinzentanne bei Zellerfeld (Harz)	3.02	
3.	Andreasheim bei St. Andreasberg (Harz)	3.03	
4.	Andreashaus bei Stiege	3.07	
5.	Schwarzenbach bei Clausthal (Harz)	3.23	
6.	Königsberg bei Goslar (Harz)	3.38	
7.	Luisenheim bei Marzell, Amt Mühlheim	3.39	
8.	Kronprinz Wilhelm Volksheilstätte bei Obornik	3.61	

Lfde. Nr.	Namen der Heilstätte.	Gesamtkosten der Anstaltspflege pro Kopf und Tag.	Bemerkungen.
9.	Cottbus	3.71	pro 1906.
10.	Römhild	3.99	
11.	Glückauf in St. Andreasberg (Harz)	4.18	
12.	Wilhelmsheim bei Oppenweiler, O.-A. Backnang	4.25	
13.	Stubeckshorn bei Soltau	4.33	
14.	Knappschaftsheilstätte Sülzhein bei Ellrich	4.38	
15.	Leopoldinenheim in Altweier (Oberelsass)	4.45	
16.	Ernst Ludwig Heilstätte bei Sandbach	4.58	
17.	Friedrichsheim bei Marzell, Amt Mühlheim	4.70	
18.	Stadtwald bei Melsungen	4.85	
19.	Moltkefels in Niederschreiberhau (Riesengebirge)	4.99	
20.	Schielo (Harz)	5.02	
21.	Hochwald bei Neustadt 1–Sa	5.18	pro 1908. Unter Zugrundelegung des Etats von 1908.
22.	Beelitz (Mark) f. Männer / Beelitz (Mark) f. Frauen	5.63	
23.	Oderberg bei St. Andreasberg (Harz)	6.09	pro 1906.
24.	Augusta Viktoria Knappschaftsheilstätte in Beringhausen bei Meschede i. W.	7.94	

Cost and Maintenance of Sanatoriums, with Special Regard to Institutions Operated by Life-insurance Associations.—(Freund.)

I. Tuberculosis sanatoriums must be developed into special hospitals for tuberculous patients.

II. Tuberculosis sanatoriums must be massively built and must be adapted for use during the whole year.

III. The interior arrangement of tuberculosis sanatoriums must be planned to allow the maintenance of perfect cleanliness.

IV. In building tuberculosis sanatoriums only the best materials are to be used, and equipment should be installed with greatest care. Such a plan of construction will save expensive repairing and renovating and make certain the permanence of the institution. The most expensive is the cheapest.

V. The rooms should be furnished in the simplest manner, every luxury is to be avoided, yet care should be taken that the sanatorium presents an air of comfort and is inviting.

VI. In order to secure the best quality of food with the lowest possible average cost per inmate, each sanatorium should have its own farm

near by, which supplies the sanatorium and on which also tuberculous patients might find occupation.

Coût et Entretien de Sanatoria avec spéciale Considération des Institutions organisées par des Associations d'Assurance sur la Vie.—(FREUND.)

I. Les sanatoriums pour tuberculeux doivent être convertis en hôpitaux spéciaux pour malades tuberculeux.

II. Les sanatoriums pour tuberculeux doivent être de construction massive et adaptés pour l'usage durant toute l'année.

III. Le plan et les dispositions intérieures des sanatoriums pour tuberculeux, doivent être établis de telle sorte qu'on puisse y maintenir une rigoureuse propreté.

IV. Pour la construction de sanatoriums, on ne doit employer que des matériaux de première qualité, et l'installation doit être organisée avec le plus grand soin. Avec un tel mode de construction on évitera les réparations coûteuses et des renouvellements, et on assurera ainsi le maintien de l'institution. Le plus coûteux est le moins cher.

V. Les chambres devront être meublées d'une manière excessivement simple, il faudra éviter tout luxe, et cependant on veillera avec soin à ce que le sanatorium présente un air de comfort et soit engageant.

VI. Afin de se procurer la meilleure qualité de nourriture à un prix moyen le plus bas possible par occupant, chaque sanatorium devrait posséder sa propre ferme, très-proche, laquelle approvisionnerait le sanatorium, et les malades tuberculeux pourraient trouver à s'y occuper.

GRADUATED LABOR IN PULMONARY TUBERCULOSIS.

By M. S. Paterson, M.B.,
Medical Superintendent, Brompton Sanatorium.

The Brompton Hospital Sanatorium is situated on the Chobham Ridges, about two and a half miles from Frimley station, at an altitude of 380 feet. It contains 110 beds—72 for men and 38 for women. Patients are not admitted directly to the sanatorium, but are selected from the patients of the Brompton Hospital by the physicians of the hospital.

Early in 1905, while resident medical officer of the Brompton Hospital, I was asked by the committee to organize the new sanatorium which was on the point of completion. I had observed that many tuberculous patients who had followed their ordinary occupations up to the time of admission were in a very fair condition of health. The case of a navvy may be cited as an example. He had worked for forty hours almost without a rest, altering a water-main, a few days previously, and though he had a considerable amount of disease, was apparently none the worse for such arduous work. It occurred to me that, if some consumptive persons under adverse circumstances, and without any medical guidance, could act thus without apparent injury, they ought, under ideal conditions and with the work carefully graduated in accordance with their physical state, to be able to undertake useful labor. On this assumption manual work should be of great advantage to patients undergoing treatment in a sanatorium, as, first, it would do much to meet the objection that members of the working classes are liable to have their energy sapped, and to acquire lazy habits by such treatment; second, it would make them more resistant to the disease by improving their physical condition; and, third, would enable them, by its effect upon their muscles, to return to their work immediately after their discharge.

The idea was a new one, and in opposition to the generally accepted medical opinion on the subject. It had, however, been shown by Dr. Otto Walther, of Nordrach, that excellent results could be obtained by graduated walking exercise, especially when, in suitable cases, this exercise was pushed to the extent of walking 20 miles a day. In this form of exertion, however, the muscles used were chiefly of the lower limbs. I had it in mind to employ also the upper limbs, which are supposed to have a more direct influence on the expansion of the lungs. The objections naturally raised to this method

of treatment were: (1) that the disease would become active again under the strain; and (2) that the exertion would tend to produce hemoptysis.

At the outset great care had to be exercised, not only from the fear that as the views which had led to the adoption of the method were possibly unsound, harm might be done, but also because the patients did not take kindly to the work, it being absolutely contrary to their preconceived views of treatment suitable to their condition. Some of them imagined for a time that it was not designed for their benefit, but purely for the advantage of the institution, and they regarded me rather as a labor-master trying to get so much work out of them than as a medical man who was endeavoring to cure their disease. Care was especially necessary in the selection of patients for the work, as had there been a case of severe hemoptysis, or of high fever or pleurisy, it would probably have been impossible to convince the patients that the method was sound, and they would have refused to work.

Walking exercise was first ordered, the distance being gradually increased up to ten miles a day. When a patient had reached this stage, he was given a basket in which to carry mold for spreading on the lawns, etc. No case of hemoptysis or of pyrexia occurred among these patients. When they had been on this grade with nothing but beneficial results for from three weeks to a month, they were given boys' spades with which to dig for five minutes, followed by an interval of five minutes for a rest. After a few weeks several of the patients on this work, who were doing well, were allowed to work as hard as possible with their small spades without any intervals of rest. As they had all improved on this labor, larger shovels were obtained, and it was found that the patients were able to use them without the occurrence of hemoptysis or of a rise of temperature. About this time many of the patients were feeling so well that it became necessary to restrain them from doing too much. The tradition of absolute obedience to the orders as to the amount of work to be done had not yet been firmly established, and one of the patients who had improved most of all was found wheeling a heavy barrow full of sand without permission. When admonished for infringing his instructions, he replied that he felt quite fit for such work, and as he would have to leave shortly and do hard work, he wanted to get into condition for it. This argument appeared to be sound, and as he was willing to take the risk, he was allowed to continue to wheel the barrow for the full labor period, which at that time was three hours a day. He suffered no ill effects, but, on the contrary, did exceedingly well, and has since been at work for over two years. It was thus shown that a tuberculous man could, in certain instances, do heavy manual labor and continue to improve in health. I accordingly decided to work out a carefully graduated scale of labor.

At the end of the first six months a great advance had been made, for the tradition of work as a method of treatment was firmly established, and the patients saw clearly that it was for their own benefit. The extension of the system required great care and minute supervision, for the patients, far from objecting to, or attempting to shirk, their appointed labor, now had a tendency to do more than they were ordered. Harder work was first prescribed for those patients who could be trusted. It was found that they could gradually be trained to use the heaviest spades, shovels, and 5-pound pickaxes with advantage to their physical condition, and without any attack of hemoptysis or rise of temperature. The patients all expressed the opinion that the work did them good, and that the harder they worked, the better they felt. Many patients have since written to say that they date their improvement from the commencement of the labor, and that they think that the hardest work did them the most good. Within the first year there were several patients who would, despite all instructions, overexert themselves and use heavier tools than they should have done. In most instances no serious harm resulted, but several of them developed fever and subsequently pleurisy. Pleurisy, indeed, appears to be a frequent result of any excessive work. One of these patients was laid up for nearly two months, and was much worse at the end of that time, although eventually he did well, and is now at work, but the extent of his illness was increased by the overexertion. The necessity of absolute obedience to the medical officer's orders was firmly established by such cases. Each patient on admission is told that he will be treated by prescribed rest and exercise, and that as he does not himself know the amount of rest or exercise which he requires, he must do exactly as he is told, and that harm will result if he does too much, and he will not receive proportionate benefit if he does too little. It is also pointed out that he must consider himself under treatment for the whole day, as the fight between his blood and the disease goes on day and night, the amount of rest and exercise being definitely fixed for the twenty-four hours.

Details of the System of Graduated Labor.

1. *Results of Physical Examination.*—Each patient on arrival at the sanatorium is examined and the extent of the disease as indicated by physical signs is noted. The patients are then divided into two classes: (*a*) Those with early disease—*i. e.*, slight signs in one or two lobes; and (*b*) those with more extensive disease—*i. e.*, with either extensive infiltration of one lobe, or infiltration of two, three, or four lobes of some duration, the lesions often showing signs of fibrosis.

2. *General Condition.*—The next points noted are the facial expression and the general physical development of the patient. These points should

always be considered together with the physical signs, as a patient with tubercle bacilli in his sputum may look very ill and have marked wasting and poor development, even though no physical signs of disease are found on examination of the chest. Such a patient is quite unfitted for much, if any, exercise; whereas a patient looking fairly well, of good development, but with physical signs indicating that even as many as four lobes are affected, may be quite capable of considerable muscular exertion. It must be remembered that the resisting power of a patient with a very limited lesion is practically an unknown quantity, and has to be determined, whereas a patient with a lesion involving four lobes, who has continued at work for some time and has remained, in spite of the disease, in fair condition, probably had a good initial resisting power.

3. *Presence or Absence of Fever.*—The next point for consideration is the temperature, which is taken in the mouth. Should this be, or have been, 99° F. or over during the week preceding admission to the sanatorium, the patient is put to bed after the journey. So long as the temperature remains at 99° in the case of men or 99.6° in the case of women, the patient is not allowed up for any purpose. Work is prohibited and reading is the only recreation permitted. Naturally, the object of this stringent rule is to try to check the activity of the disease. I consider that if a patient with few signs of disease, when absolutely at rest in bed, still has a temperature of 99°, active disease is present. Such patients are usually kept together in one ward for the sake of cheerfulness, male and female patients being, of course, in separate wards. After the temperature has been normal for a week or ten days the patient is allowed up for dinner, but returns to bed as soon as the meal is finished. So long as the temperature is unaffected by this exertion the patient is gradually allowed up for longer and longer periods. In practice it is found that the longer the time the patient has had to stay in bed before his temperature subsides to, and remains at, the normal level, the more protracted must be the period before he can be allowed to remain up for a whole day in safety. When this stage is reached, the patient commences to work with the fingers—sewing, making mats, mops, etc.

4. *Exercise.*—If the general condition and appetite are good and the patient is feeling well after from ten to fourteen days of this treatment, he is allowed to walk half a mile a day for a week. He then gradually goes through the grades of exercise subsequently to be described as suitable for those patients whose temperature is normal. Patients with apparently limited disease, but who are in poor general condition and without fever, are allowed to be up all day, but are not permitted to take further exercise than is entailed by walking to and from the dining-hall for their meals. The remainder of the day is spent resting, and work entailing no physical exertion is allowed, with the sole object of occupying their minds. As

their condition improves they are allowed to walk half a mile a day, then a mile a day, and so on, until a distance of six miles a day is achieved. The rate of increase in the amount of exercise depends upon such factors as the patient's disposition, weight, and appetite. It is not possible to make a definite statement as to the number of days during which the patient should be set to walk half a mile, two miles, four miles, and so on, as each case requires to be judged on its merits and on the response to treatment. A patient allowed to walk a mile a day for fourteen days may be doing well, yet the increase of half a mile may cause the temperature to rise to 99°. If this occurs, he is then ordered to rest for a day or so before recommencing with a mile a day. It will thus be seen that the exertion required for each grade of work acts as a test not only of the fitness of the patient for such labor, but also of his fitness for an increased amount of exercise.

The grades of work may be summarized as follows: (AI) Walking from half a mile to 10 miles daily; (1) carrying baskets of mold or other material; (2) using a small shovel; (3) using a large shovel; (4) using a pickax; and (5) using a pickax for six hours a day. Patients in Grades 1, 2, 3, and 4 work for four hours a day.

Grade 1.—Basket work is subdivided into three sections. In the first the patient carries a load of about 12 pounds in weight a distance of 50 yards up a gradient of 1 in 10.7—*i. e.*, rising 14 feet in that distance. Such patients carry in a day 80 loads, or, in other words, they will carry 8½ hundredweight a distance of 50 yards and return for a distance of 4000 yards with the empty basket. In the second section the weight carried is about 18 pounds, the conditions being the same, and these patients carry about 13 hundredweight per day. In the third section the weight carried is 24 pounds. A patient on this work carries during the day about 17½ hundredweight for the same distance.

Grade 2.—The small shovel is the ordinary coal scoop provided with a long handle. Patients commencing on this grade of labor will dig two tons of earth a day and raise it seven feet into a cart, and as they increase in strength will in a day lift about four tons the same height.

Grade 3.—The large shovel is the ordinary shovel used by a navvy. Patients on this grade will dig and lift about six tons a day a distance of seven feet.

Grade 4.—Pickax work is the hardest work possible, and consists of breaking unbroken ground, excavating, etc.

Concrete-mixing comes under the heading of pickax work, as although the large shovel is used, the work is heavier than moving sand or mold. Each man moves about ten tons a day, and has to keep going or he stops the whole of the men, whereas on the other work he can take his own time.

When a patient has been on a grade of labor for about three weeks, his fitness for harder work is considered. If the temperature has been normal, the weight satisfactory, the appetite good, and if he is feeling well (this is to be determined by watching the way in which he performs his work), then he is put on harder work. Here may be noted an interesting psychological effect of physical improvement. Many patients on their arrival are somewhat remarkable for a certain sullen and apathetic attitude, but as soon as their physical condition undergoes amelioration, all traces of gloom and depression leave them and they become transformed into lively, cheerful individuals. After three weeks it is usually found that the patient who is working within his strength is of his own accord working harder than he did when first placed in that particular grade. This is specially noticed with "basket men," who carry about 8 pounds' weight of earth. The quantity is gradually increased, and finally the patient is allowed to fill his own basket, which he usually does to its fullest capacity.

I consider the basket grade the most important of all, and patients, as a rule, spend far more time in this grade than in any other. I regard it as the connecting-link between walking and work. It does not entail much exertion, and yet brings into use nearly all the muscles of the body, and so fits the patient for light work. I am always careful to have a definite and apparent object in this and all work, so that the patients can see the result of their labor. Patients hate nothing more heartily than work which is of no practical utility.

Patients who have successfully gone through the above grades and worked for six hours a day are, three weeks before their discharge, put to work at their trades, if they have a trade, in order that the muscles used in their particular work may become accustomed to it before they leave the sanatorium. These examples are given to show approximately what amount of energy is exerted in each grade of labor. Patients are not confined to the work enumerated above, but are given other work corresponding in severity to the use of the tools mentioned. For instance, painting, hoeing, and chopping wood are equal to the work of Grade 2. Sawing trees into firewood is equal to the work of Grade 3. Planing wood is equal to the work of Grade 4. Any form of labor can be utilized, but an estimate must be made of the amount of energy which it involves. Patients who have reached the stage of walking four miles a day or any higher grade of work make their own beds, change their bed-linen, clean their wards and windows, polish the floors of adjacent corridors, and keep the dining-halls clean and the brass-work bright.

The grades of exercise and work for the women are similar to those for the men, but the various implements, such as baskets, shovels, etc., are of smaller size. These patients are not allowed to work as hard as the men,

and consequently do not accomplish as much in the same time. They also keep in order their own part of the grounds, cultivating a small kitchen garden, and, in addition, they have charge of the poultry. The final grade corresponding to the hard navvy work of the men consists of scrubbing work indoors.

One of the first indications that a patient is taking too much exercise is that he loses his appetite and suffers from slight headache. If he continues to do the same amount of work, the temperature will rise to 99°. This temperature is the danger-signal, and any patient who has a temperature of 99° and is suffering from the slightest headache is immediately ordered to bed. In cases of extensive disease—*e. g.*, of three or four lobes with fibrosis—a temperature of 99° has not the same significance, but it is still regarded as a danger-signal and the patient is specially watched. A temperature of 99.6° in women appears to correspond with the temperature of 99° in men. It is necessary to emphasize the importance of the significance of a temperature of 99°. If this degree of fever is observed and the patient is ordered to rest for a few days, no harm will result; but if it is disregarded and the patient continues to work, he will, later on, in addition to the headache, complain of pains in his joints and limbs—a condition very closely resembling influenza. Indeed, the result of overwork is often called influenza. Should the patient still continue to work, or should he have, against orders, very much overexerted himself, the temperature will rise to 100° or over and pleurisy may develop. This complication seems to be the invariable result of excessive work or overlooking the danger-signal—*i. e.*, the temperature of 99°.

The following facts are significant. During the first year that the sanatorium was opened the patients were allowed to play games, such as croquet, quoits, etc., in the evenings and on Saturday afternoons, but it was soon found that many patients in this way took too much exercise. Their improvement was not satisfactory, as they were apt to get too keen over the games and to forget that they were under treatment. A rule was therefore made that patients were not to play any games, such as croquet, until they had reached the stage of basket work. Much better results followed its adoption. The reason is obvious: a patient walking his prescribed four miles a day is having sufficient exercise, but if he plays a game of croquet in addition, he has too much. It was therefore established, and it is a fact of the utmost importance, that the hours of recreation must be regulated with just as much care as the hours of work. The accompanying chart No. 3 shows the effect produced by an act of indiscretion upon the temperature of a patient who should have been resting all day. It occurred upon a certain summer evening when, as he considered himself to be free from control, not having realized that he was always under treatment, he went for a short

walk of about half a mile. Playing the piano or singing must be regarded as exercise, as I have known a musical patient after an hour at the piano experience a rise of temperature to 99°, with headache and general malaise.

After the sanatorium had been opened about eighteen months and further experience had been gained, I came to the conclusion that the patients who had a slight rise of temperature (99°) as a result of overwork, and for whom, in consequence, rest for a few days had been prescribed, were not infrequently not only none the worse for this sequence of events, but rather the better. Some patients even appeared to date the commencement of their improvement from the period of rest following overwork. It was accordingly decided to be unnecessary to put these patients back to the earliest grade of work, and they were permitted, after a few days' walking exercise, to recommence work in the grade reached when they suffered from overexertion. This practice has been continued ever since, with satisfactory results, but it is impossible to lay too much emphasis on the fact that such patients require to be watched with especial care as regards loss of appetite, the presence of headache, or of a rise in temperature. In the course of my earlier experience I observed cases of another type—*i. e.*, patients who, from the indications given by the temperature, appetite, and demeanor, ought to have been doing well, but who remained in a stationary condition, and were, in fact, only "marking time." It was doubtful whether such patients should be given harder work or more rest. They were considerably under the normal weight, and their general state did not suggest a capacity to undergo an increase of labor. After careful consideration it was determined to try the effect of harder work, with a view to improving the appetite. I am glad to state that all such patients have shown progressive improvement on being given work of a higher grade.

The diet is liberal, and consists of the ordinary food which the working classes provide for themselves when they are in a position to afford it. The patients have three meals in the day. Breakfast consists of bacon, etc.; dinner consists of meat and suet or milk puddings; and supper consists of soup, oat cakes, Cornish pasties, or cheese, etc. For the first sixteen months the patients used to have three pints of milk and an egg every day; now they only have milk in their tea, coffee, and puddings, and they are not given an egg every day, but they do just as well on this as on the more stereotyped and conventional form of diet, and do not become excessively corpulent. Of course, patients who are very emaciated have milk if it is thought necessary, but as a routine milk is not used except as it would be in their own home. The standard aimed at as regards nutrition is to raise the patient's weight to a few pounds above his highest known weight or to a few pounds above the normal weight for his height. Patients who tend to become excessively fat have their diet reduced in quantity.

Medicines such as cod-liver oil, malt, etc., are not used. Practically the only drugs prescribed are aperients.

The following work, which has already been accomplished, will show the scope and variety of the tasks which the patients have performed: About 900 tons of mold, sand, and gravel have been carried in baskets an average distance of 200 yards. The whole establishment has been kept in firewood; it has not been necessary to obtain any from outside sources. The boots of the patients and staff have been kept in repair. The patients' block of buildings has been painted. The whole of the grounds has been kept in order. In addition to these occupations the patients have been engaged in mixing and laying 1000 tons of concrete and in excavating and moving to a distance of 300 feet 4175 tons of sand in the construction of a reservoir. The reservoir is 108 feet long, 54 feet wide, and 12 feet deep; and the walls are 4 feet thick at the base and 1½ feet at the top. In addition, 3¼ acres of land have been trenched, cleared, and brought into cultivation.

In order to ascertain the results of the system of graduated labor, all patients on their discharge have been requested to keep the administration informed as to their progress. In considering these results of the treatment of pulmonary tuberculosis by graduated labor, it is to be distinctly understood that I am only quoting cases that went through *all* the grades. Furthermore, the statistics refer to patients discharged during 1905, 1906, and 1907, so that every patient has been at work at least seven months, and some as long as three years. All patients who have not reported themselves within the last six months, although they may have been known to be at work since their discharge, are here classified as unreported.

253 are at work.
9 are not at work.
74 have not reported.
8 are dead.

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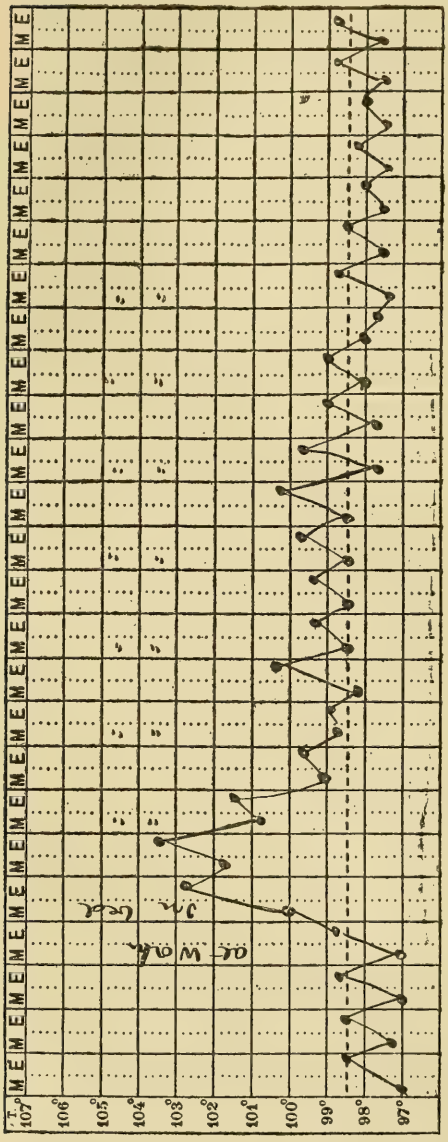
A point which I wish to emphasize is that all of the above patients returned to their previous occupations, whatever they happened to be, and not to light outdoor work. To advise the latter has always seemed to me like recommending plenty of good food and milk to those who are practically penniless: excellent advice, but impossible to carry out.

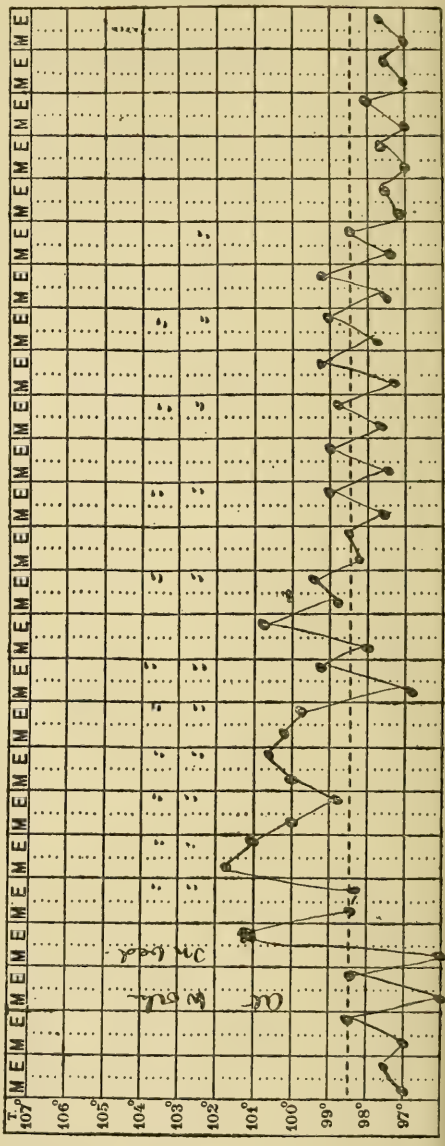
Some eighteen months ago Dr. A. C. Inman suggested to me that the explanation of the satisfactory results obtained from the system of graduated labor was that the work caused an inoculation of the patient by his tuberculin. This theory, the origin of which is given in Dr. Inman's paper, was supported by the fact that after a rise of temperature, and therefore an auto-

inoculation, patients were often better than before, and that patients who were not improving on a certain grade of work did improve on harder work. The theory is that the harder work gives rise to an autoinoculation, whereas the lighter work fails to do so. For the past eighteen months I have used this as a working hypothesis in determining the suitability for any particular grade of labor, and have found it to be of very great assistance. The method entails a more careful graduation of the labor, as two important questions have to be answered: (1) Is the patient doing work which is too hard? (2) Is he doing sufficient work to keep himself properly inoculated? In other words, suitable work has to be found for what is regarded as the exact medical condition of each patient. When Dr. Inman commenced to examine the bloods of the patients and required cases of a certain kind, I was able to find without any difficulty examples of cases required: as, for instance, a patient who was autoinoculating himself slightly, or, again, one with a high opsonic index. The same is true of patients who from excessive autoinoculation had low indices, and of patients whose index was constantly low. The results of the examinations of the blood were most convincing, because they bore out so exactly the condition of the patient as determined by clinical observation. One case was especially useful. It was that of a man who was regarded as possibly fit for harder work, but whose condition was such that it was judged to be unwise to take the risk of increasing his task. The blood was examined and his index found to be practically normal. He was then put on harder work for a week and the index again taken. Again, it was practically normal. He was then put on the heaviest work and performed it without harm. In a case of this kind the opsonic index proves an invaluable guide, saving perhaps months of time, by determining within a week that the patient is fit for the hardest work, when clinically we should hesitate to come to such a conclusion.

The theory of autoinoculation shows the reason for absolute rest after a rise of temperature to 99° accompanied by a headache; that is, a slight autoinoculation, the reason being to prevent all further autoinoculation until the patient has recovered from the one already given. The six charts here exhibited show the temperatures of six different patients. The first three had severe autoinoculations and were sent to bed, but not kept absolutely lying still. This was at the time before I had learned the importance of doing everything to prevent autoinoculation when there were signs and symptoms that it was going on. The second three charts show patients who had temperatures with headaches (autoinoculation) and who were sent to bed, *but were, in addition, treated as typhoids.* They were instructed to lie absolutely still; were washed by the nurses; and were not allowed to go to the water-closet, but had to use a bed-pan. In other words, everything possible was done to prevent any further autoinoculation. After this explanation I think the charts speak for themselves.

Dr. Inman's work, so far as it has gone, confirms the value of graduated manual labor in the treatment of pulmonary tuberculosis, and has done so

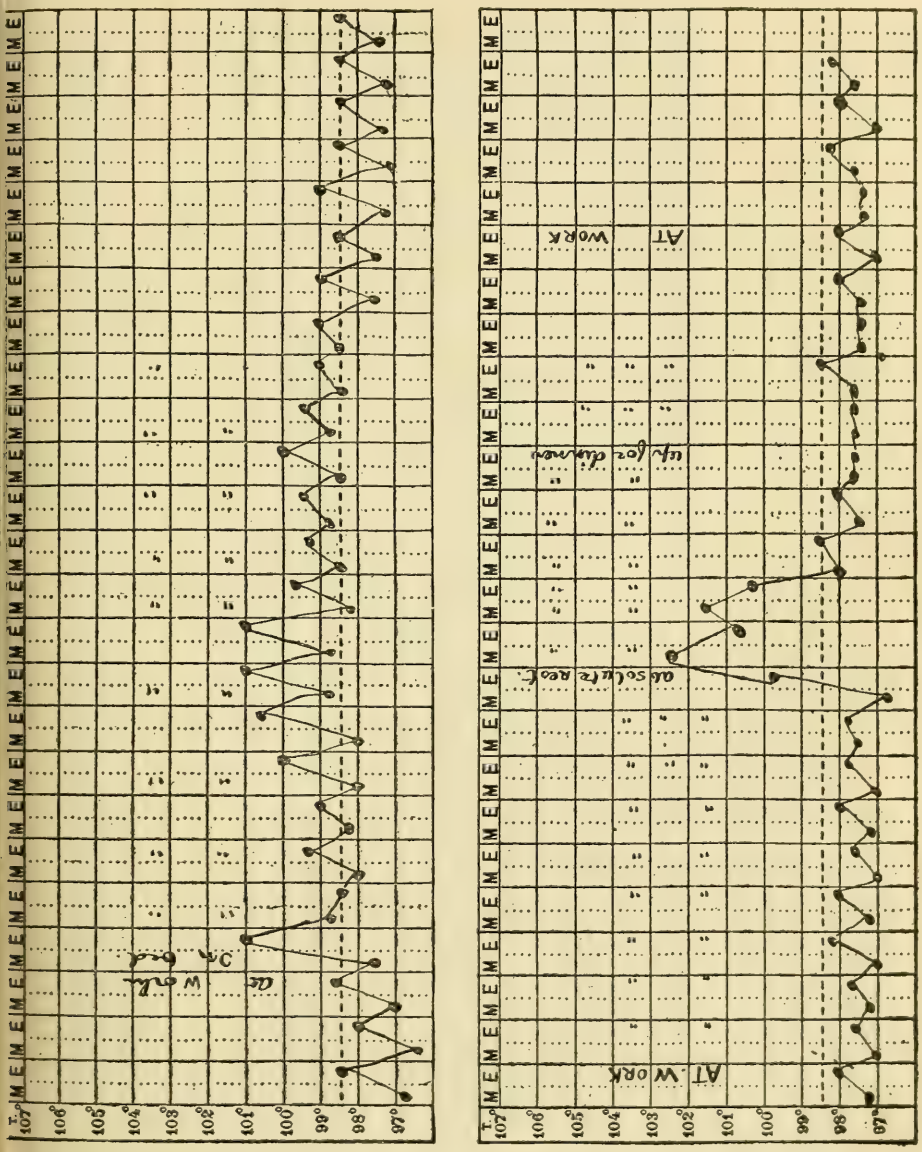




in a manner that could only be determined by a further trial lasting over several years.

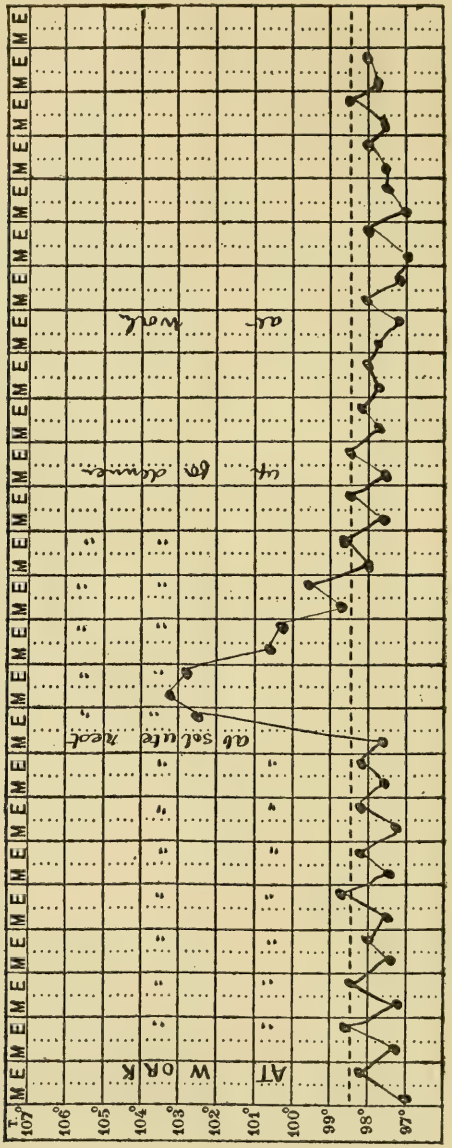
The points so far determined appeared to me to be as follows: (1) Suitably selected patients can be gradually trained to do the hardest navvy work

for six hours a day, the result being that their general condition is much improved, while some lose both their sputum and their tubercle bacilli.



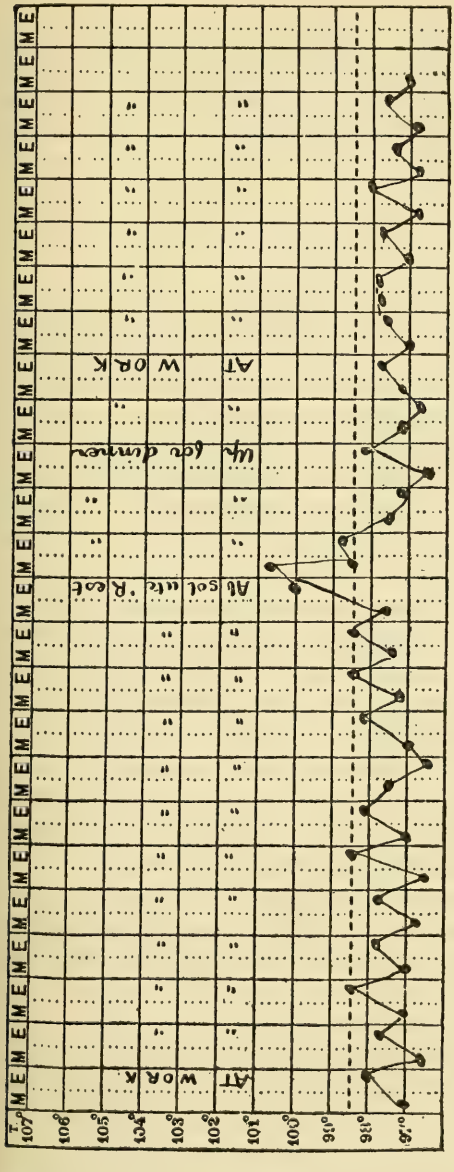
(2) Certain patients who do not improve on light work show marked improvement on harder labor. (3) Patients who have slightly overexerted them-

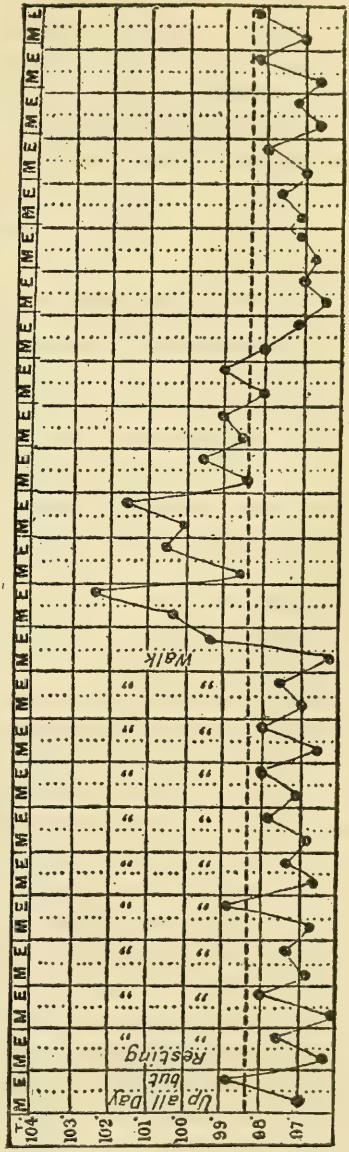
selves and are kept at rest for the few following days are subsequently not only not worse, but may be, in their own opinion, better.



A very good guide to the progress of men can be obtained from the quantity of sputum. Work, as does also tuberculin, often increases the sputum, and this must be remembered. A patient with early disease and two

ounces of sputum during the day is seldom fit for much work. Patients who only expectorate in the morning are usually fit for work if their physical





condition is good. These are general rather than hard-and-fast rules. In women the amount of sputum is not of so great value, as patients who are capable of giving themselves severe autoinoculation often have none.

My observations so far lead me to the conclusion that graduated labor is a definite medical treatment for cases of pulmonary tuberculosis and raises the general health and resisting power of the patients.

Finally, I should wish to express very strongly the opinion that the combination of rest, pure air, and overfeeding is not the only treatment for chronic pulmonary tuberculosis, and equally strongly to advise those physicians who may adopt these suggestions contained in this paper to pay particular heed to the word *graduated*, and to remember the importance of the temperature of 99° F.

El Trabajo Graduado en la Tuberculosis Pulmonar.—(PATERSON.)

Intento de correjir la idea de que el trabajo debe emplearse en cada caso y en todos los tiempos.

El sistema del trabajo gradual en el Frimley Sanatorium, empieza con casi un extremo mas de descanso que en ningún otro sanatorio.

En unión con Dr. Paterson el Dr. Inman ha demostrado, por medio del index opsónico, que el ejercicio tiene un efecto definitivo sobre la sangre en los casos de tuberculosis pulmonar. Este tambien influye sobre la temperatura.

La influencia sobre la sangre y la temperatura se creé ser debida á los productos tóxicos en el lugar de la lesion ó a una "auto-inoculacion" (Wright) cuando la toxina llega al torrente circulatorio y á la linfa. Persistencia de esta fiebre y de este estado de la sangre conduce á la muerte del paciente. El descanso absoluto es necesario para prevenir esto.

Detalles del sistema empleado. Pacientes con temperatura de 99° (Fahrenheit), y con dolor de cabeza, es puesto en la cama, no se les permite lavarse ellos mismos ni de ir al lavatorio. Uso de todos los medios posibles para evitar la tos que no es acompañada del descargue del esputo.

El ejercicio gradual empiesa después y la temperatura es constantemente observada. El trabajo del paciente es aumentado gradualmente bajo una supervision constante hasta que estos pueden hacer trabajos pesados sin alterar la temperatura.

Principales indicaciones de la "auto-intoxicacion":

1. Perdida del apetito (usualmente significa exesivo trabajo).
2. Al paciente se le ve hacer el trabajo con demasiado esfuerzo.
3. Una variación irregular de la temperatura siempre bajo lo normal.
4. Una temperatura de 99° en casos prematuros en los hombres.
5. Una temperatura de 99° y dolor de cabeza.

THE EFFECT OF EXERCISE ON THE OPSONIC INDEX OF PATIENTS SUFFERING FROM PULMONARY TUBERCULOSIS.

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The study of the part played by the blood as a protective agent in bacterial infections has recently entered upon a new phase. Hitherto the subject had been mainly one of scientific interest only; the results obtained and the principles and theories evolved had been for the most part confined within the walls of the laboratories. The phagocytic action of the white corpuscles and its rôle in immunity had ceased to interest the clinician. The discoveries of Ehrlich, brilliant as they were, were appreciated by few who were not pathologists, the "side-chain theory" with its difficult nomenclature having but little effect on bedside medicine. But the publication of Sir Almroth Wright's investigations and the principles of immunity expressed by him have not only thrown a new light upon clinical problems hitherto in obscurity, but have produced results and suggested inquiries of great importance in the domain of practical medicine. Wright, by a modification of Leishman's technic, completely separated all three elements necessary for the phenomenon of phagocytosis—viz., white corpuscles, serum, and bacteria—and was thus able to investigate the rôle played by the blood in bacterial infections more fully than had previously been possible. In his lecture before the Harvey Society of New York he shows that as regards active immunization there are three great agencies by which immunizing responses can be evoked in the organism: (1) the inoculation of bacterial vaccines; (2) artificially induced autoinoculations; and (3) spontaneous autoinoculations. In previous publications he had expounded the principles of vaccine therapy and had been able to show, by means of curves constructed from the opsonic indices of patients vaccinated against their infection, the definite train of events which follow upon a single inoculation. He has defined these successive phases as the negative phase, the positive phase, and the phase of maintained high level. Freeman, working in Wright's laboratory, next opened up a new field for investigation by his observations on the effect of massage on gonococcal joints. Owing to this work it has

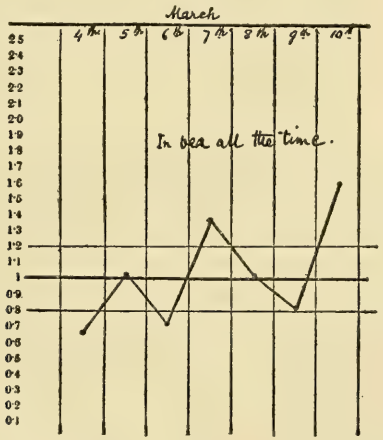
been possible "*to show that autoinoculations follow upon all active and passive movements which affect a focus of injection and upon all vascular changes which activate the lymph-stream in such a focus.*" Further, it is obvious that, as Wright puts it, "where in association with a bacterial invasion of the organism bacteria or bacterial products pass into the general lymph- and blood-stream, intoxication effects and immunizing responses, similar to those which follow upon the inoculation of bacterial vaccines, must inevitably supervene." And it is by the agency of such autoinoculations that nature achieves curative effects in bacterial infections. The far-reaching importance of these observations on spontaneous and artificially induced autoinoculations decided me to investigate the part played by autoinoculation in pulmonary tubercle. Moreover, it is obviously desirable, before attempting to treat a disease, however rationally, to try to find out what the body is doing of itself, and to what extent extraneous circumstances, such as movements, influence these attempts on the part of the body.

The Technic.—In these experiments the technic as carried out by Wright and Douglas has been followed. (1) The corpuscles were very carefully washed in sterile salt solution (0.85 per cent.) after the first centrifugation, so as to get rid of all traces of serum and citrate solution. (2) The emulsion—a culture, obtained from a solid medium, and suspended in 1.5 salt solution was used. (3) The serum was always collected in Wright's tubes and the blood allowed to clot at room temperature. The blood was always examined the same day as it was drawn, usually within five or six hours. Before each experiment a "trial trip" was made with the normal serum with a view of seeing that all the constituents of the experiment were satisfactory. In the case of the normal serum, an attempt was always made to obtain an average count of one bacillus per cell—*i. e.*, an average of about 100 bacilli in 100 cells. In all experiments 100 polymorphonuclear cells were counted. The films were stained as follows: (1) Fixed in a saturated solution of hydrargyrum perchloridum, one quarter of a minute. (2) Stained with Ziehl's carbolfuchsin, warm, one minute. (3) Decolorized with sulphuric acid, $2\frac{1}{2}$ per cent. (4) The red cells were decolorized with acetic acid, 4 per cent. (5) Counterstained with aqueous methylene-blue, 1 per cent. With a view to eliminating as far as possible the personal element, and to prevent the possibility of a biased mind influencing the results, all experiments were made with unknown bloods. That is to say, after the bloods to be examined had been drawn, each blood-tube, bearing the name of the patient, was handed over to the assistant, who rubbed out the names and replaced them with numbers, in any order he liked, and kept this key to the bloods himself. The indices were then worked out by experiment before seeing the key, and afterward the curves exhibited in this paper were constructed. *Thus in no cases during the experiment was it known which blood was being examined.*

It was found in practice that when examining day after day a number of such unknown bloods, several samples of the blood of a single healthy individual mixed with other bloods showed indices which varied rather over one decimal place on either side of unity. Further, it has been determined by Bulloch and others that the bloods of presumably healthy individuals present opsonic indices varying between 0.8 and 1.2 on either side of unity. It was therefore decided to regard all indices within these limits as normal.

Before considering the effect of exercise upon the opsonic index in pulmonary tuberculosis it must be mentioned that in active disease spontaneous autoinoculations are continually taking place, even though the patient be at rest. Such patients, as Wright has expressed it, are living in "a succession of negative and positive phases." Chart 1 is an example of this. Further, it must be remembered that the degree of autoinoculation is in proportion to

Chart 1.



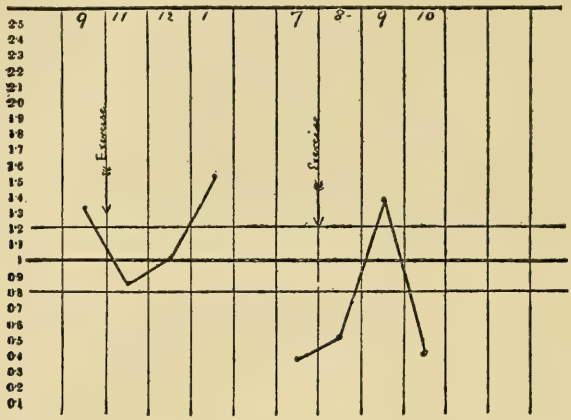
the activity of the disease. There are cases, indeed, in which autoinoculations cease when the patient is at rest, but reappear after any movements sufficient to affect the focus of infection. In all charts which follow the first index was taken before the patient had got out of bed in the morning, the second was taken immediately after exercise, and the third and fourth during a subsequent rest of from one and a half to two hours' duration. Chart 2A graphically represents the effect of exercise on the opsonic index in cases of early pulmonary tuberculosis, Chart 2B the absence of variation in healthy persons.

Chart 2C shows the index of a tuberculous subject—(*a*) at rest, (*b*) after exercise.

Wright points out, when comparing the respective advantages of artificially induced autoinoculations and inoculations of bacterial vaccines as means of treatment in bacterial infections, that if the former method is

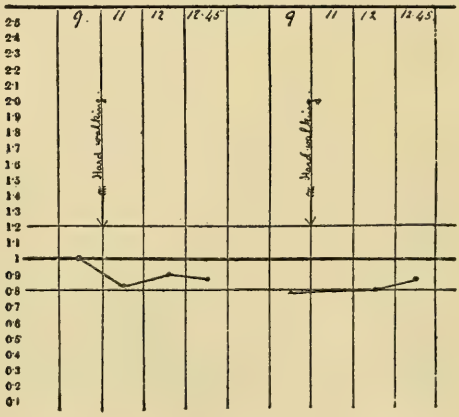
adopted, unmeasured doses of a living culture are being used, and therefore the method can never be entirely dissociated from risk. Now, at the Brompton Hospital Sanatorium at Frimley during the past two and a half years

Chart 2A.



the patients during their stay have been treated by gradually increasing amounts of work, the last grade being full navvy work, almost as severe as it is possible for even a healthy individual to accomplish. In spite of the

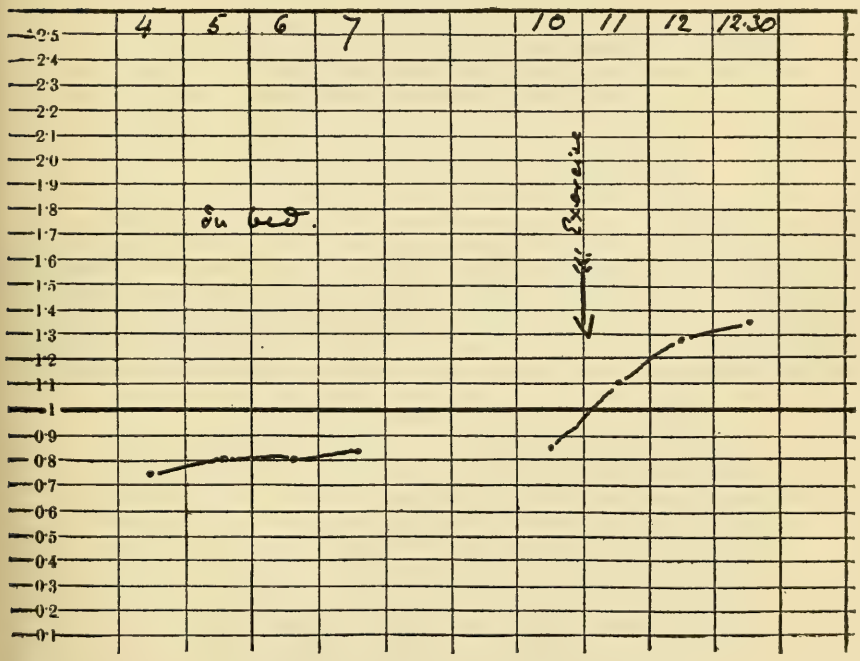
Chart 2B.



greatest difficulties Dr. M. S. Paterson, the medical superintendent, has evolved a scheme of very carefully graduated work-exercise, beginning with gentle walking and ending with concrete-making, excavation work, etc.

This has been accomplished with tuberculous patients, many of them showing extensive signs of disease in the chest, with expectoration containing tubercle bacilli, but without fever. The treatment has been remarkably successful. It has only been possible to accomplish this (1) by instituting the most careful graduation of the exercise; and (2) by close observation of the temperature chart, work being at once stopped when fever appears. It follows from what has gone before that the work-exercise scheme at Frimley must be associated with autoinoculation, and that probably the treatment consisted unintentionally of carefully graduated, artificially induced auto-

Chart 2c.



inoculations. It was therefore decided to investigate the Frimley cases from this point of view, and the following observations were made during a stay of one month at the sanatorium. In all, over 300 bloods were examined, from which a few cases only are selected under each heading for the sake of brevity.

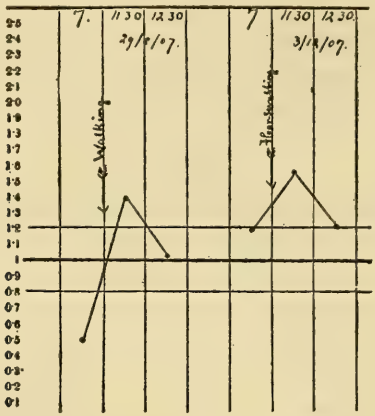
The cases examined may be grouped as follows: (*a*) Cases which when examined at Brompton had a low index, and which at Frimley with graduated work show a rise of the opsonic index:

Case 1 (Chart 3).—The patient was a female, aged eighteen years. Diag-

nosis, chronic pulmonary tuberculosis. Left upper lobe, rather quiescent second stage; left lower lobe, infiltration. Duration, nine months. Onset, insidious, with cough. Sputum, tubercle bacilli present.

Case 2 (Chart 4).—The patient was a male, aged twenty-six years.

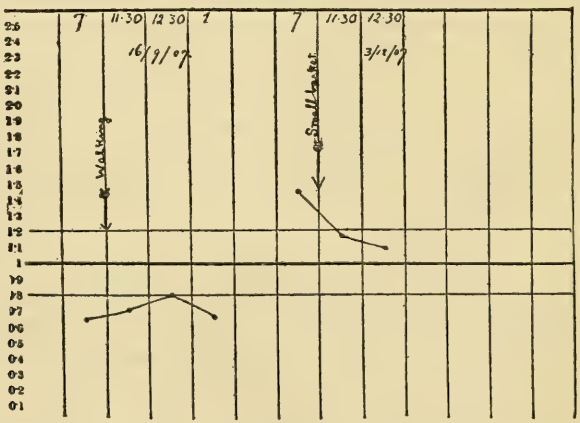
Chart 3.



Diagnosis, infiltration of the right upper and lower lobes. Duration, sixteen months. Onset, cough and hemoptysis. Sputum, tubercle bacilli present.

Case 3 (Chart 5).—The patient was a male, aged twenty-six years. Diagnosis, infiltration of the right upper lobe. Duration, one year. Onset, cough followed by large hemoptysis. Sputum, tubercle bacilli present.

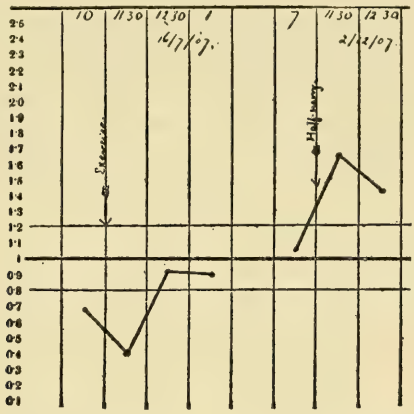
Chart 4.



Case 4 (Chart 6).—The patient was a man, aged twenty-three years, a bookbinder. Diagnosis, chronic pulmonary tuberculosis. Extent, extensive infiltration of the left upper and left lower lobes; infiltration of the right upper lobe. Duration, eleven months. Onset, hemoptysis. Sputum, tubercle bacilli present.

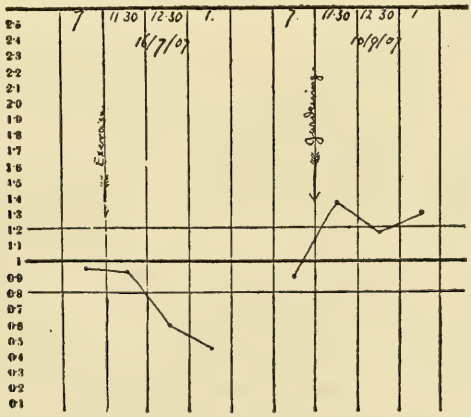
It might be argued that these high readings were not the result of auto-inoculation, but merely of increased general physical fitness, due to fresh air, etc., as obtained by sanatorium life. If a high index were merely evidence of a better resistance to the disease, this might be so, but the high index

Chart 5.



expresses the fact that in the serum of the patient under observation there are substances which increase the phagocytic power of the white cells in excess of those contained in the blood of any healthy non-tuberculous subject. These substances are elaborated only in response to a defined stimulus,

Chart 6.



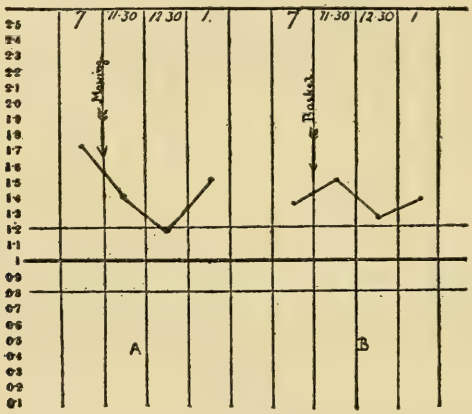
the introduction of bacteria or their products into the blood- and lymph-streams, and in these cases the only "tuberculin" used was that elaborated by the patient from himself and for himself. Thus we are dealing with examples of artificially induced autoinoculation.

(*b*) Investigations on cases working on the different grades of the labor scheme:

Case 1 (Chart 7, A).—The patient was a male, aged twenty-one years, a clerk. Diagnosis, chronic pulmonary tuberculosis. Infiltration of the left upper lobe and apex of the lower lobe. Duration, seven months. Mode of onset, cough. Sputum, tubercle bacilli present. The patient is doing very well on full work. He has lost sputum and tubercle bacilli. The temperature is normal. He is now two stones overweight.

Case 2 (Chart 7, B).—The patient was a male, aged thirty-nine years, a carrier. Diagnosis, chronic pulmonary tuberculosis. Right lung, upper lobe, second stage early; lower lobe, first stage. Left lung, upper lobe, second stage early. Duration, two years. Onset, insidious (hemoptysis +).

Chart 7.



Sputum, tubercle bacilli present. The patient is doing well on light work. The temperature is normal. Still expectoration with tubercle bacilli.

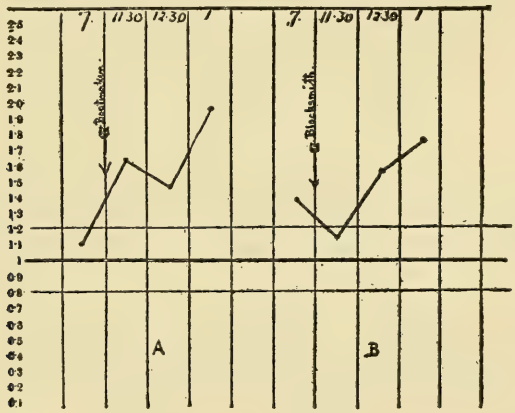
Case 3 (Chart 8, A).—The patient was a male, aged twenty-four years, a general laborer. Diagnosis, chronic pulmonary tuberculosis. Extent, right upper lobe, excavation; left upper lobe, infiltration. Duration, three years. Onset, hemoptysis. Sputum, tubercle bacilli present.

Case 4 (Chart 8, B).—The patient was a male, aged twenty-two years, a blacksmith. Diagnosis, chronic pulmonary tuberculosis. Pleurisy left side. Infiltration of the left upper lobe. Duration, seven months. Onset, insidious (hemoptysis +). Sputum, tubercle bacilli present.

It was found that in 41 out of 43 cases the index was at some time of the day well above the normal, and, what is of even more importance, in no case did the exercise, even though severe, lower the index below the normal line—that is, the autoinoculation was never so great as to produce a negative phase and therefore never in excess. It was observed during these investigations that in some bloods examined tuberculo-agglutinins appeared in association with the immune tuberculo-opsonins. This must be taken as

another evidence of an immunizing response on the part of the organism. When the difficulties of such a method of treatment and the danger of the weapon employed are taken into consideration, it will be readily understood that every now and then, in spite of the most careful supervision, an excessive autoinoculation must take place. Such an overdose is readily recognized clinically. A patient previously doing well on the grade of work prescribed for him and with no abnormality of temperature suddenly complains of feeling tired, of loss of appetite, and of headache, and the temperature chart registers an elevation to 99° or 100° F. These are precisely the symptoms which are found during the negative phase after an excessive dose of bacterial vaccine. Owing to the extreme care and judgment exercised by Dr. Paterson in the selection of suitable work for the patients, and to the rigid supervision carried out, not only during work hours but throughout the day,

Chart 8.

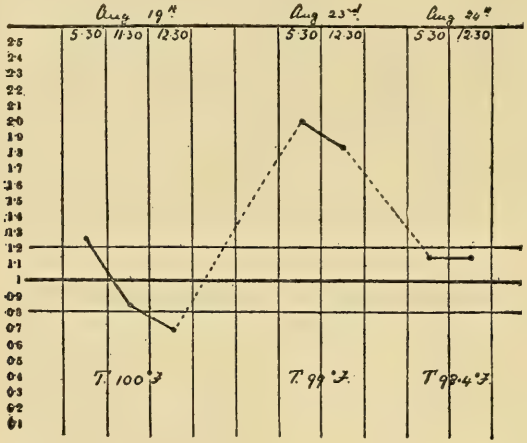


these overdoses are very infrequent at Frimley. During my stay of one month at the sanatorium only two transient instances of such overdosage occurred, and in both cases the opportunities were taken to examine the bloods (Charts 9 and 10). In both cases the febrile rise and other symptoms coincided with a negative phase; and while in both cases a positive phase appeared afterward, in the first the recovery was simultaneous with the decline of the fever. It should be noted that this patient was kept in bed, while the other was allowed to do modified work during his pyrexia.

(*c*) If a focus of infection becomes arrested, autoinoculations from this focus cease. In Wright's words: "Where an artificial inoculation can no longer be induced in a focus which previously could be influenced, we are entitled to conclude that the focus of infection is extinct." Therefore, some of the early cases of pulmonary tuberculosis, many of whom had lost expectoration and tubercle bacilli, who were doing the hardest possible work

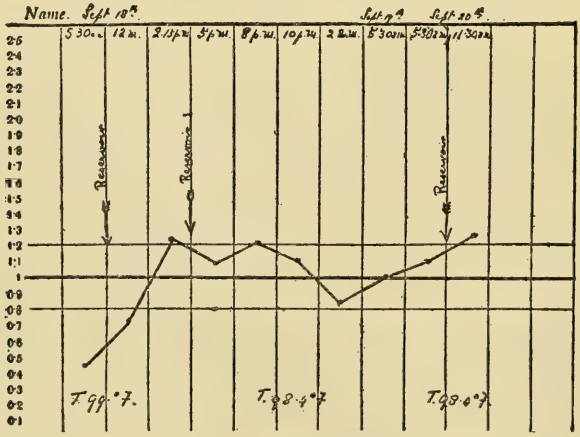
without rise of temperature or discomfort, might be expected to afford evidence in their blood that their focus of infection was no longer aglow, but arrested. The following results were obtained from patients constructing a water reservoir (full navvy work).

Chart 9.



Case 1 (Chart 11, A).—The patient was a male, aged twenty-four years, a brass finisher. Diagnosis, chronic pulmonary tuberculosis. Infiltration and fibrosis of the right upper lobe. Duration, eighteen months. Mode of

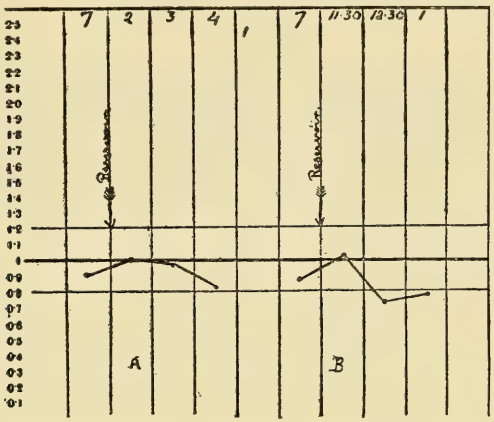
Chart 10.



onset, hemoptysis. Sputum, tubercle bacilli present. Highest known weight, 12 stones 2 pounds. The patient was able to do full work; lost sputum and tubercle bacilli. The temperature was normal. The weight on discharge was 12 stones 10 pounds.

Case 2 (Chart 11, B).—The patient was a male, aged twenty-three years, a warehouse salesman. Diagnosis, early pulmonary tuberculosis. Extent, infiltration of the left upper lobe. Duration, three months. Highest known weight, 9 stones 10 pounds. Onset, insidious (hemoptysis +). Sputum, tubercle bacilli present. The patient was able to do hardest work. Tem-

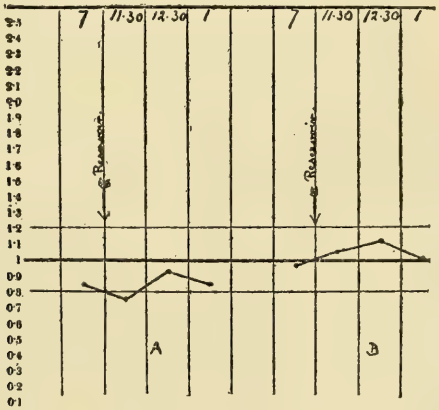
Chart 11.



perature normal. Weight on discharge, 9 stones 12 pounds. He lost expectoration and tubercle bacilli, though slight cough persisted.

Case 3 (Chart 12, A).—The patient was a male, aged twenty-six years, clerk. Diagnosis, chronic pulmonary tuberculosis. Extent, right upper

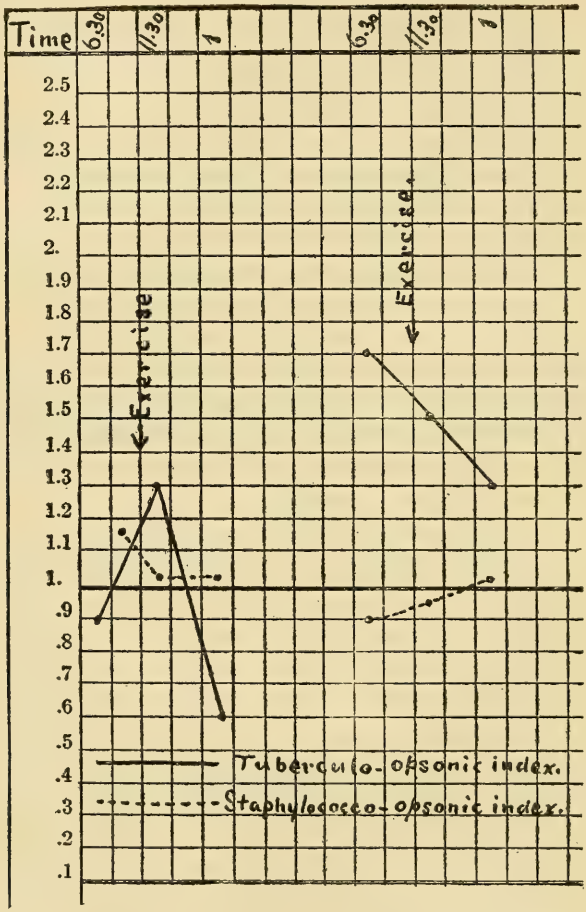
Chart 12.



lobe, infiltration; left upper lobe, infiltration. Duration, nine months. Onset, hemoptysis. Sputum, tubercle bacilli present. The patient was able to do hardest work. Temperature occasionally 99° F. Weight on discharge, 10 stones 12 pounds. Lost cough, expectoration, and tubercle bacilli.

Case 4 (Chart 12, B).—The patient was a male, aged twenty-five years, an iron-molder, Diagnosis, chronic pulmonary tuberculosis. Extent, infiltration and fibrosis of the right upper lobe. Duration, twelve months. Onset, pleurisy (nine years ago). Sputum, tubercle bacilli present. Highest known weight, 9 stones 12 pounds. The patient was able to do hardest possible work. Temperature normal. Weight on discharge, 10 stones 5 pounds. Lost expectoration and tubercle bacilli.

Chart 13.



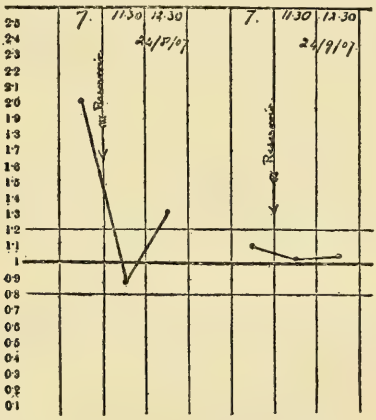
All these cases showed a return of the opsonic index to the normal, although the patient was doing the hardest of work. Therefore the clinical opinion that the disease was arrested is confirmed by a precise scientific observation. These curves, again, negative the supposition that the high index noted in earlier stages might be due simply to increased general fitness

of the body due to sanatorium life, since cases doing best of all and about to be discharged as showing "total arrest" gave an index no longer above the normal, but within normal limits. The stimulus had been removed and the body was no longer called upon to elaborate protective substances; while if the high index in these cases had been caused solely by generally improved health, it ought to have persisted so long as the robust health continued.

The following two curves show that we are dealing with an immunizing response, for the tuberculo-opsonic index varies with exercise, while the staphylococco-opsonic index is normal throughout.

Two cases may be added in which the progress from a high tuberculo-opsonic index produced by graduated artificially induced autoinoculations to a normal index during the performance of the hardest work was actually observed.

Chart 14.



Case 1 (Chart 14).—The patient was a male, aged twenty-six years, a shop assistant. Diagnosis, chronic pulmonary tuberculosis. Extent, infiltration of the right upper lobe. Duration, three months. Onset, "influenza" and cough. Sputum, tubercle bacilli present. Highest known weight, 10 stones 15 ounces. Able to do hardest work. The patient lost expectoration and tubercle bacilli. Temperature normal. Weight on discharge, 10 stones 3 pounds.

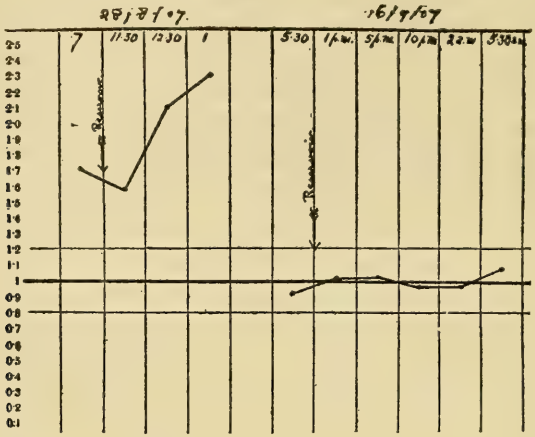
Case 2 (Chart 15).—The patient was a male, aged thirty-two years, a tin-worker. Diagnosis, chronic pulmonary tuberculosis. Extent: right upper lobe, infiltration; left upper lobe, infiltration. Duration, eleven months. Onset, pleurisy. Sputum, tubercle bacilli present.

(*d*) There are cases which give a normal index before and after the hardest exercise, and yet have not lost all expectoration or tubercle bacilli in the sputum. The patients were without fever, were apparently in robust health, were doing full navvy work, and showed physical signs of arrest, but

in the early morning occasionally expectorated a little sputum which contained a few tubercle bacilli (two or three on a slide).*

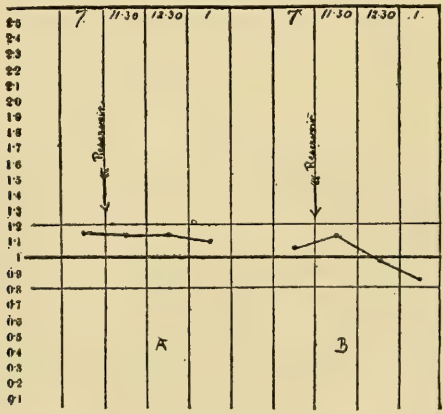
Case 1 (Chart 16, A).—The patient was a male, aged thirty-nine years, a butler. Diagnosis, chronic pulmonary tuberculosis. Right lung: upper

Chart 15.



lobe, infiltration; lower lobe, infiltration. Left lung: upper lobe, infiltration. Duration, pleurisy four years before. Onset, cough six months. Sputum, tubercle bacilli present.

Chart 16.



Case 2 (Chart 16, B).—The patient was a man, aged twenty-six years, a compositor. Diagnosis, chronic pulmonary tuberculosis. Extent, infiltration of the left upper and lower lobes. Duration, sixteen months. Onset,

* Cf. Dr. J. K. Fowler's case, quoted in his book on "Diseases of the Lung," Fowler and Godlee, 1898, ch. xxxiv, p. 369.

hemoptysis. Sputum, tubercle bacilli present. Highest known weight, 7 stones 7 pounds. The patient was able to do hard work. Moist sounds in the lung disappeared. Temperature normal. Weight on discharge, 8 stones 2 pounds 12 ounces. Scanty expectoration in the early morning, which still contained tubercle bacilli.

The practical outcome of these investigations is this. The labor scheme so ably devised and carried out by Dr. Paterson has been submitted to a new scientific test by means of which its effect on the blood of the patients has been traced. The opsonic index has shown that the exercise has supplied the stimulus needed to induce artificial autoinoculation, and that its systematic graduation has regulated this in point of time and amount. This coöperation with the natural efforts of the blood has enabled Dr. Paterson to send his patients back to their accustomed work, however hard it may be. But the investigation has done more than explain a successful mode of treatment. Dr. Paterson agrees with me that with the aid of the opsonic index he can regulate the stimulus with scientific accuracy and obtain his results more certainly and more rapidly. This, of course, involves work in the laboratory. But it also means a more rapid and a more certain discharge of the patient, which is the main object of the sanatorium, and as a consequence of this the power to treat a larger number of patients. I may be permitted to conclude by expressing my thanks to the staff of the Brompton Hospital for their permission to publish the cases under their care and for their continuous encouragement and useful advice during the whole of my work.

L'effet de l'exercice gymnastique et du mouvement sur l'index opsonique des malades souffrant de tuberculose pulmonaire.—(INMAN.)

1. Pendant la phase active (fébrile) de la tuberculose pulmonaire, des auto-inoculations peuvent avoir lieu spontanément.

2. Dans une phase moins active de la maladie, ces auto-inoculations n'ont pas lieu spontanément quand le malade repose, mais elles peuvent être provoquées par l'exercice ou par des mouvements suffisants pour affecter le foyer de la maladie.

3. Ces auto-inoculations, "spontanées" et "produites artificiellement," se montrent par un changement dans l'index opsonique-tuberculeux. Ce changement n'a pas lieu dans des sujets non-tuberculeux.

4. Quand des exercises graduels ou du travail sont employés comme méthodes de traitement de la tuberculose pulmonaires il est important de se rendre compte que dans ces cas "la tuberculine élaborée par le malade" est employée.

5. 95% des malades examinés au Sanatorium du Brompton Hospital avaient des index opsoniques au-dessus de l'index normal, pendant un temps quelconque de la journée. Les malades, qui étaient tous en train de faire des travaux selon leurs forces, avaient des températures normales.

6. Une élévation de la température correspond à une phase opsonique négative, indiquant une auto-inoculation excessive, qui peut être arrêtée par un repos absolu.

7. Quand l'index opsonique ne varie pas après des exercices difficiles, bien qu'on avait obtenu cette variation auparavant, c'est un signe que la maladie s'est arrêtée.

8. L'auteur montre qu'une série de malades, qui ont été soumis au traitement contre la tuberculose pulmonaire, peuvent être classés comme: "maladie arrêtée, avec persistance des bacilles de la tuberculose dans le crachat."

Die Wirkung von Bewegung auf den opsonischen Index der an Lungentuberkulose leidenden Kranken.—(INMAN.)

1. Während des aktiven (fieberischen) Stadiums von Lungentuberkulose kommen Autoinokulationen von selbst vor.

2. In einem weniger aktiven Stadium der Krankheit kommen diese Autoinokulationen nicht von selbst vor, während der Patient sich ruhig verhält, aber sie können durch Bewegung oder Freiübungen angeregt werden.

3. Diese Autoinokulationen, ob "spontan" oder "künstlich erzeugt," zeigen sich durch eine Variation in dem tuberkel-opsonischen Index. Diese Variation erscheint nicht in tuberculosefreien Individuen.

4. Wenn stufenweise Uebungeno der Arbeiten als Behandlungsmethoden für Lungentuberkulose angewendet werden, ist es von Bedeutung, dass wir es uns verwirklichen, dass "Tuberkulin in dem Patienten fabriziert" gebraucht wird.

5. Fünfundneunzig Prozent der in dem Brompton Hospital Sanatorium untersuchten Patienten hatten einen opsonischen Index höher als die Norm irgend einmal während des Tages. Die Kranken, die alle angemessene Arbeit ausführten, hatten normale Temperaturen.

6. Eine Steigerung in der Temperatur entspricht einer negativen opsonischen Phase, welche eine übermässige Autoinokulation anzeigt, die durch absolute Ruhe gehemmt werden kann.

7. Wenn der opsonische Index keine Variation in Bezug auf heftige Bewegung zeigt, während früher eine solche Variation erlangt worden ist, kann man es als einen ziemlich guten Beweis ansehen, dass die Krankheit gehemmt ist.

8. Beweis wird erbracht, um zu zeigen, dass eine Klasse von Patienten, die für Lungentuberkulose Behandlung untergangen sind, als "Hemmung der Krankheit mit Weiterbestand von Tuberkelbazillen in dem Sputum" bezeichnet werden kann.

THE APPLICATION OF REST AND EXERCISE IN THE TREATMENT OF TUBERCULOSIS.

By F. M. Pottenger, A.M., M.D.,

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The construction of the human organism is such that its most important functions are carried on best when the body is subjected to an evenly balanced application of rest and exercise. This fact should be borne in mind in all discussions relative to the application of these principles to pathological conditions. While it might be advisable at times to enforce greater exercise than that generally employed, and while at times it might seem best to enforce almost complete rest, yet we must not lose sight of the fact that a combination of the two is always desirable, if it can be had without jeopardizing the best interests of the patient.

In applying rest and exercise to those who come under our care for the treatment of tuberculosis, we must first suit these to them as individuals, remembering that one can stand a great deal more than another. Then we must suit them to the disease and the stage of the disease in which the patient presents himself.

As a basis for determining the amount of rest and exercise to be prescribed in the treatment of tuberculous cases I would call attention to the following effects which tuberculosis produces upon the organism. Early in the disease the toxins which are elaborated by the tubercle bacilli are poured out into the blood-stream and find their way throughout the body, especially affecting the nervous system, and, through it, every important function of the body. The respiratory, circulatory, and digestive systems are all disturbed; the muscular system is deprived of its tone, and the heat-regulating mechanism is rendered unstable. In advanced tuberculosis not only do we have to contend with these effects produced by the toxins, but also the effects produced upon one organ by the disturbances of function and the pathological changes wrought in another.

The conditions which must especially be taken into consideration in prescribing rest and exercise for a patient are, aside from the natural strength or powers of endurance of the individual, the condition of the heart and the ability of the patient to exercise without causing fatigue, an increase of

cough, shortness of breath, or a rise of temperature. Of course, this does not take into consideration any of the usual complications, such as hemorrhage, which always call for rest.

Thus, it will be seen, the problem of treating early and advanced tuberculosis is very different. In early tuberculosis the problem is comparatively simple. Most patients in the early stage are able to take that amount of exercise which is necessary to keep their musculature and general bodily functions in tone without doing themselves harm; while in the later stages this is not true.

The heat-center seems to be especially unstable in tuberculosis. This manifests itself very early in the disease and continues to its end. It shows itself by a rise in temperature following upon an exertion that would not affect a well person at all. In the early stage a short walk will often cause a rise of a fraction of a degree (which can be utilized in making a diagnosis), and in the later stages it will cause much more; while a severe exertion may cause a rise of several degrees. Such rises should be avoided unless the temperature is found to decline soon after the cessation of the exercise. While in early tuberculosis the harm produced by such a rise is not apparent, in late tuberculosis it is very evident.

Sometimes exercise causes such an increased amount of toxins to be thrown out into the blood-stream as to produce a reaction such as that which follows the administration of vaccines made from the tubercle bacillus. A temperature due to this cause would probably not show itself at once, if we may judge from the experience gained by the therapeutic use of vaccines, for such a reaction usually comes on from four to twenty-four hours after they have been administered. On the other hand, it would not subside as quickly as many of the transient temperatures which follow immediately on exertion and disappear in an hour or two. When exertion is followed by a rise in temperature, as a rule, it is a sign that the exercise has been too severe, and the next time exercise is taken, it should be reduced in amount below the point causing such rise.

The production of fatigue should also be avoided. When a patient can take exercise without fatigue, other contraindications being eliminated, such exercise is beneficial, for it strengthens the muscles, quickens the flow of blood and lymph, and indirectly influences in a favorable manner the various important functions of the body; but if carried to the point of fatigue, instead of strengthening and building up the body, the vital forces are depressed, and the patient's resisting power is for the time lowered. Energy that should be utilized in combating the infection is required to restore the overworked body-cells.

It has been suggested that, if exertion causes the bacillary toxins to be thrown out into the blood-stream, producing an autoinoculation with

bacillary vaccines, this procedure should be utilized in the treatment of tuberculosis. To this the well-founded objection has been offered that such a procedure is unscientific and irrational, because there is no way of controlling the dosage. I would offer as another objection that when an autoinoculation is produced by exertion, it is produced at a most inopportune time. As a result of sufficient exercise to cause an appreciable autoinoculation, there is produced more or less fatigue. Thus the inoculation is given to the patient at a time when the body-cells, which must react and produce antibodies in order to bring about the establishment of immunity, are in a state of depressed activity owing to the fatigue which has been caused, consequently they cannot respond to their full capacity in the elaboration of protective substances. This theory finds support in the experiments which have been made, which show that the agglutinating power of the blood is lowered by fatigue.

Exercise may cause dyspnea of either pulmonary or cardiac origin. If the dyspnea is of cardiac origin and the patient's heart is not seriously diseased, provided other contraindications are not present, graduated exercise, adapted carefully to the powers of the heart, may improve its tone and strengthen its force, thus removing the dyspnea. If, on the other hand, the dyspnea is of pulmonary origin (due to a diminished amount of lung tissue), exercise must be carefully restricted, for exertion calls for more oxygen, and the only way the lungs can respond is by an increase in the number of respiratory efforts.

The heart requires very careful consideration in all discussions relative to the application of rest and exercise in the treatment of tuberculosis. It is the organ which is most affected by exercise, and likewise the one which must bear the brunt of the disease in tuberculosis. It is the most important organ that we have to consider from a prognostic standpoint.

One of the early signs of tuberculosis is an instability on the part of the heart. While at rest the pulse may not be any quicker than normal, upon exertion it is markedly accelerated; and this condition holds throughout the disease. In health the pulmonary and systemic circulations balance each other, and the heart works without strain. In pulmonary tuberculosis, on the other hand, an inflammatory process is present, and, according to the extent and the nature of the pathological condition present, the pulmonary circulation is impeded or cut off, and to this extent the right heart is subjected to a greater or lesser strain. At the same time the heart is incapacitated for withstanding this extra strain by the degeneration which occurs in the heart muscle consequent upon the toxemia and general muscle atrophy, as well as the interference in the nervous mechanism of the organ through the binding down of the vagus in adhesions and in masses of enlarged glands.

The heart, then, must always be carefully considered in tuberculosis. It must be spared and strengthened for the great strain to which it is subjected. Early in the disease this care should be instituted, so that the patient may recover, if recovery is possible, with a sound heart. Late in the disease such care is imperative, that the patient may recover at all.

The point to this discussion is that rest and exercise must be prescribed for the individual. Neither rest nor exercise should be prescribed to the exclusion of the other. Both must be employed, and with the same care and judgment as the remedies of the pharmacopœia, if the best results are to be obtained.

This discussion is pertinent to-day, when the attempt is being made to offer the advantages of scientific treatment to as many sufferers from tuberculosis as possible. If patients could work during the time when they are being treated, the cost of treatment would be reduced. The plan of manning institutions by patients has been tried with some degree of success. There are many institutions where the patients are allowed, and some where they are compelled, to do a certain amount of work. In others practically all the service of the institution is rendered by patients. Such experiments are at least interesting, and in treating charity cases enough may be saved in maintenance to make such a plan practicable; but the work should be carefully prescribed so that the physical exertion in nowise reduces the patient's chances of recovery and in nowise retards the progress toward that end. It is impracticable to make every patient work or to make any patient work at all times, for there are times when rest is imperative.

In treating the well-to-do, my experience is that they do the best when they are free from cares and labor, when the exercise is prescribed for them according to their powers and requirements. Of course, it must be borne in mind that the charity patient has much the advantage of the well-to-do while being treated in institutions for the cure of tuberculosis. For him, the change from his former surroundings to that of an institution is so great that he might improve even if he continued working; while for the latter the change is not so great, for he is accustomed to having good food, comfortable but not always hygienic homes, and a certain amount of good care.

My experience in treating patients taken from all social conditions impresses me with the fact that they all do best when they are free from any necessary labor, either of a physical or mental nature; but that those for whom institutional life is a great change, as mentioned above, can, if there are no contraindications to exercise, make favorable progress toward recovery, and still perform tasks suited to their working capacity. But even in these cases it must be remembered that there are times when they should not work.

No tuberculous patient should ever enter into a game that he cannot stop at any time before he gets tired. The same is true of work. No patient should ever have a task assigned him that he cannot leave at any moment should it begin to tax his strength.

If charity tuberculous patients are to work while they are being treated, the work should be carefully measured and suited to the patient and his condition. It cannot be done as a routine matter, but only after most careful individualization.

La aplicacion del descanso y del ejercicio en el tratamiento de la Tuberculosis.—(POTTENGER.)

Las funciones del organismo se efectuan mejor cuando ambos, el descanso y el ejercicio son aplicados en proporciones apropiadas. La cantidad de cada uno de estos deberá ser en proporcion al poder de la resistencia natural del paciente y de las condiciones patologicas existentes.

En la prescripcion del descanso ó el ejercicio en la tuberculosis las condiciones de la respiracion, de la circulacion, del sistema muscular, y del aparato digestivo deberán ser concideradas, una atencion especial deberá darse le á la condicion del corazon, y á la capacidad del paciente al ejercicio sin que este cause fatiga, aumento de la tos, disnea ó elevacion de la temperatura.

El ejercicio es un agente que produce el arrojo de las toxinas en el torrente circulatorio, lo cual causa practicamente los mismos sintomas que la tuberculina; mas debido al hecho de que la dosis no puede ser regulada, y de que el paciente recibe dicha dosis en el tiempo cuando este esta causado é incapaz de producir suficiente cantidad de cuerpos neutralizantes. Esta autoinoculacion no puede conciderarse como un metodo cientifico en la administracion de la vacuna del bacilo.

Si el trabajo toma el lugar del ejercicio apropiado en el tratamiento de los casos de caridad, tales trabajos deberan prescribirse de acuerdo con las necesidades del individuo, y al paciente no debera permitirsele el trabajo fuerte ni hacer mas trabajo que aquel que es apropiado al poder de su resistencia. A ningun paciente deberá dársele una tarea que no pueda abandonarla al momento que el así lo desee, cuando ésta pasa el limite de sus fuerzas.

REST OF THE LUNG IN PULMONARY TUBERCULOSIS.

By Norman Bridge, M.D.,
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A lung that is tuberculous should be exercised as little as possible; it should be kept as still as may be, to the end that its recovery may be hastened. This measure is more important if the disease is confined to one lung, for then it is possible the more to abbreviate the movements of the diseased part.

There are numerous arguments in favor of this contention. It is a general and acknowledged principle that tuberculous tissues in general are in the best condition for recovery when they are immobilized. This principle is the basis of the nearly universal practice with all the tissues of the body except lung tissues. The bones and joints especially are always kept still when tuberculous, but there seems to have grown up in the professional mind a notion that lung tissue is an exception to this rule, and that deep breathing, breathing exercises, and expansion of the chest—and of the lungs presumably—are likely to hasten recovery. Many physicians think they have witnessed benefits from these measures; that under this treatment cases have recovered more rapidly than they would have done without it. My own belief is that they are mistaken, and that all patients do better with as great a degree as possible of rest of the diseased lung tissue.

In the nature of the case it is very difficult—nearly impossible—to record very accurate observations and facts bearing on this question, and free from the possibility of error and misconstruction; so the matter must always rest more or less upon the opinion of observers; and the observers will be, in the nature of the human mind, more or less biased.

Many difficulties beset a careful study of this subject. A lung is rarely completely immobilized either by the accidents of the disease or artificially; by outside appliances it is nearly impossible to immobilize it completely; movement of the mediastinum is sure to give it some motion. The lung is usually in constant motion in breathing. Rarely is a case of pulmonary tuberculosis free from cough; and cough means more or less unnatural exercise of the lungs. Violent cough always means deep inspirations, great increase of intrapulmonary air-pressure, and consequent stretching of the air-vesicles —the thing that happens in deep breathing and by so-called pulmonary gymnastics. The patient who coughs little has thereby little extra lung

motion; while he who coughs much has a large degree of pulmonary gymnastics. Much talking, loud talking, public speaking, and singing have the same effect as coughing; so has violent exercise that induces deep breathing. Therefore the effect of lung gymnastics artificially applied is always subject to uncertainty from these influences. How much of any result is due to applied exercise, and how much to the cough, no man can tell.

In order to make any very useful generalizations as to the effect of artificial lung gymnastics it would be necessary to observe with the greatest precision a large number of cases, carefully classified as to the amount of rapid or violent exercise, the amount and character of cough, the amount and character of speaking and singing, and whether in each class artificial gymnastics were employed, to what degree, and for how long a period continuously.

It would require that at least six classes of a hundred patients each should be under observation for at least two years for each patient, with the uninterrupted employment of the breathing exercises in every case. These six classes would need to be compared with the same number and size of classes of similar patients, who should be under observation for the same length of time respectively, and who should have identical treatment and régime in all particulars as the first group, except that there would be no artificial breathing exercises. This means that at least twelve hundred pulmonary patients must be under observation constantly for a period of at least two years for each patient, in order to determine in a general way the effect of rest and exercise of a tuberculous lung. It would require a great degree of scientific knowledge and acumen, and infinite patience and constancy, as well as a mind with a high order of scientific and judicial fairness, in order to carry out such a study. I venture to say that no such careful study has anywhere been made or is likely to be made.

There are a few facts that are admitted generally, which point to the benefit from rest of the diseased lung, and to the harm from the exercise in any but the gentlest way of such an organ. These facts are to my mind rather convincing in favor of my contention, especially so in view of the lack of any strong arguments that have, so far as I know, been offered to the contrary by the advocates of lung gymnastics.

1. There is no good reason why a tuberculous joint should be kept still and a tuberculous lung should be treated to the violence of gymnastic exercise. All the teachings of physiology and pathology, as I read them, point to a similar treatment for each. That it is well-nigh impossible under usual conditions to keep a diseased lung entirely still is no reason for adding to its troubles artificially.

We do not permit such notions to prevent us from giving rest as far as

possible to the kidneys, heart, and digestive organs, when diseased in certain ways. Why should we make an exception of the lungs?

2. If we do violence to a wound or an open sore, free from redundant granulations, we expect that it will delay the recovery and increase the amount of scar tissue. We do not ordinarily pull and bruise a wound in the hope of hastening its recovery; then why do this to a tuberculous lung? The fibrosis of the lung tissue in tuberculosis is composed of what is essentially scar tissue, and might be increased by violence. Fibrosis usually accompanies the recovery from pulmonary tuberculosis, so it may be useful, and probably is, but too much of it leads to ulceration and destructive dissolution of the vital parts of lung tissues—the air-vesicle walls—and hastens debility and death.

3. There is some evidence that violence, such as is produced by severe cough, deep inspiration, and stretching of the tissues, may disseminate the disease—cause it to spread to healthy lung tissue and to other organs. This postulate is entirely rational.

4. It is contended by some that stretching the air-vesicles does good by increasing the activity of the blood circulation in the lungs and by better aëration of the blood, for the reason that more air is inspired. Nobody seriously contends, I hope, that stretching the very masses of tuberculous tissue helps. The effect of the stretching is mostly upon the normal or nearly normal lung tissues lying outside of the diseased areas, and even if this were useful, vastly greater benefits come of giving the patient at all times perfectly clean outdoor air to breathe. If the tuberculous masses are stretched, hemorrhage and resulting harm are sure to occur.

5. The evidence is accumulating that the Bier* method of passive congestion tends to retard or prevent tuberculosis. If this is true, then it is important to retard circulation in a tuberculous lung area, not to increase it. Gymnastics increase the circulation; fixation prevents excessive circulation, and so favors recovery.

Cough is a form of pulmonary gymnastics, and in degree exactly proportioned to the violence of this pathological exercise. In general it is more violent than the artificial gymnastics usually prescribed. Reducing cough by lessened expectoration, reduction of the amount of phlegm; even measurably suppressing the cough by the will of the patient—all these help toward recovery. This is a well-conceded fact. The improvement is fairly due to several influences flowing from the lessened cough: one is reduced physical exercise, whereby fatigue of the body is avoided; another is certainly the relative absence of lung stretching, which favors the process of recovery of the tuberculosis.

* "Passive Hyperemia of the Lungs and Tuberculosis," Wilder Tileston, Jour. Am. Medical Association, April 11, 1908, No. 15, vol. l.

6. The evidence is considerable that in unilateral cases the artificial or accidental immobilization of the tuberculous lung, as by serous pleural effusion or by inflation of the pleural cavity by sterile air or nitrogen, helps powerfully toward recovery of the lung disease. It stops cough completely, cuts out all the physical labor of coughing, lessens pain, and, best of all, it puts the diseased structures to complete rest and thus permits their recovery.

The partial resting of a lung by bandages and adhesive straps, and by jackets and other forms of apparatus applied outside the body, while never able to stop motion entirely, substantially always does some good. It relieves cough, lessens the pain of severe exercise of the muscles of respiration, and avoids the violence to the diseased structures that always comes from motion and cough.

7. I know that it has been claimed that in phthisis much cough is necessary to expel phlegm; that if the phlegm is retained in the bronchial tubes, great harm will result; that cough is the friend and not the enemy of the patient, and hence that cough medicines—anodynes that suppress the cough—are harmful. Much of this is heresy, and I confess with sorrow that formerly I myself taught it. The truth is that phlegm does very little harm in the bronchi, except the harm of obstructing the flow of air to the air-vesicles; and when it is so abundant as to seriously obstruct the movement of air, it can usually be brought up with a gentle effort of coughing. Pus lying loose in the bronchi is absorbed very little, and hence does not produce much fever. Violent cough to expectorate phlegm is vicious in the highest degree; it does infinite harm and never any good. The popular notion that cough ought to be suppressed, stopped, is founded on good philosophy, and it is wiser than the teaching of some modern doctors. The real fault of the popular notion is not that it has led to the suppression of cough in chest diseases,—an effect that is distinctly useful,—but that it has caused the swallowing of vast quantities of anodyne cough medicines, patent nostrums mostly, that have often disturbed digestion and sometimes started the opium habit.

Therefore anything that prevents severe cough, whether it be artificial or pathological fixation, partial or complete, of a diseased lung; or suppression by the will of the patient, or even by the less harmful anodynes, to reduce the irritability of the bronchial nerves, is distinctly beneficial to diseased lung tissue and to the patient in general, and nearly or quite always works toward recovery. It is the duty of the physician to defend such tissues as far as possible from all artificial violence in the form of gymnastic exercise, from severe coughing, from loud talking, and from violent exercise.

Repos du Poumon dans la Tuberculose pulmonaire.—(BRIDGE.)

Il faut garder le poumon tuberculeux aussi tranquille que possible, surtout si la maladie est unilatérale. Il y a beaucoup d'arguments en faveur

de ce précepte. C'est la règle presque universelle, dans le cas de tuberculose des autres organes, de les garder aussi tranquilles que possible. L'immobilisation des poumons soulage des symptômes et probablement aide la guérison.

Il est difficile d'obtenir des statistiques sures sur cette question; c'est pourquoi les conclusions sont basées principalement sur l'analogie et des opinions. Il faudrait avoir au moins douze cent malades, placés en observation pour deux ans chacun, avec un observateur prudent et judicieux, avant de pouvoir faire une généralisation definitive quelconque. Une étude de ce genre n'a pas encore été faite, et il n'est pas probable qu'on en fasse une.

Voici quelques-uns des arguments: (1) Il n'y a pas une seule raison avancée pour garder une articulation tuberculose tranquille, que ne puisse s'appliquer au poumon. (2) Violence faite à une blessure augmente les tissus cicatrisateurs. Pourquoi pas aussi la fibrose du poumon? (3) La toux violente et la gymnastique du poumon peuvent disséminer la maladie. (4) La tension imposée au tissu malade peut le blesser; la gymnastique et la toux violente imposent réellement une tension au tissu non-tuberculeux plus grande qu'au tissu tuberculeux. Il vaut beaucoup mieux faire respirer au malade l'air frais. (5) La méthode Bier de congestion passive a une tendance sans aucun doute à retarder la maladie et aide la guérison. Elle est plus effective avec un poumon qui reste tranquille, car alors il y a plus de congestion passive. (6) L'immobilisation artificielle dans les cas unilatéraux semble toujours aider la guérison du poumon. Il en est de même de l'effusion pleurale de serum. (7) La toux pour expulser le phlegma des bronches n'est pas importante et la toux est nuisible. Le pus dans les bronches est très peu absorbé est à peine nuisible. C'est pourquoi il est souvent très utile de supprimer la toux par force de volonté, ou même par des médicaments non violents.

THE ULTIMATE RESULTS OF SANATORIUM TREATMENT.

By Lawrason Brown, M.D.,
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Inasmuch as objections can be brought forward against any classification, and inasmuch as no personal equation can enter into a discussion of the number of living and dead after a longer or shorter lapse of time among the patients discharged from any sanatorium, I have endeavored in this paper to analyze the ultimate results of sanatorium treatment by a study of the percentages of the living and dead among the discharged patients. Time is the only test of cure in many patients who have had pulmonary tuberculosis, for the vast majority of all patients who have had physical signs at all marked retain them to some extent for a long number of years, or indeed for all time, even if every symptom has disappeared.

Immediate Results.—Since this is so, it is apparent that the immediate results obtained at the sanatorium may be justly classified in a way different from the ultimate results. The immediate results are often based upon the remaining symptoms and the physical signs, if there be any. Accordingly, in America the usual custom is to classify the patients upon discharge from the sanatorium as apparently cured, arrested, improved, failed, or died. "Improved" or "failed" are at times grouped under "active." The sole object of the German insurance sanatoriums has been, in many cases at least, to restore to the patient his full working capacity, or as much of it as is possible in a short period of residence, say, about three months. The cure of the patient is not attempted, and on discharge he is classified by the amount of work the physician in charge thinks he might be able to do. The personal element in such a classification is, of course, overwhelming. Paterson, in England, and others have developed ideas of systematic work for the patients while at the sanatorium, and this eliminates the personal element. The compilation of the immediate results is comparatively easy, for the data are always at hand.

Ultimate Results.—In regard to the ultimate results, the usual way also has been to classify the patients by their symptoms and physical signs. For these patients, however, physical signs are very unreliable, and symptoms of much more importance. By this is meant that physical signs may

persist when the patient presents for years no symptoms and has worked hard at his usual occupation. It may be affirmed that the disease is then only arrested, but the same is also true of a man after amputation of a leg. Some, indeed, assert that no man can be said to be cured of pulmonary tuberculosis until after his death; but this is an extreme view.

The working capacity is also employed as a basis for classification in the ultimate results, and, as it is here based on tested working ability, is far more valuable. However, when all facts are duly considered, it must be recognized that duration of life eliminates best the personal equation, as there can be no discussion in regard to whether or not a patient is alive or dead. I would suggest, then, as the best method of discussing this problem, the separation of all patients into two classes—living and dead; and, further, the subdivision of those patients by the number of years they enjoyed health good enough to enable them to work.

Method of Obtaining Statistics.—The best method to obtain statistics for these results is a problem of importance for every sanatorium. Any one who has tried to follow patients who leave a sanatorium knows how nearly impossible it is to get a physician's report upon the patient's condition. Many patients see no physician, and many physicians make such a hurried and superficial examination that their notes are of no value. The symptoms are more easily obtained, for a list can be sent the patient, who can answer them intelligently. The working capacity and the duration of life can easily be accurately obtained from the patient or his friends, and, indeed, in case of the latter event, from the physician who signs the death certificate.

On account of the great importance of these statistics it has been deemed wise to describe in detail the method employed at the Adirondack Cottage Sanitarium to keep in touch with all discharged patients and to learn of their death when it occurs. These methods entail considerable expense and much correspondence. When the patient's history is taken, careful note is made of the patient's address, of the name and address of his physician, of some member of his family, and of any club or society to which he belongs. These details are especially important with the poorer patients from the large cities, where so many changes of residence are made that it is impossible otherwise not to lose all trace of many patients. When the patients are weighed each week, their weight is noted on a ruled card, three by five inches, the reverse of which, when they leave, serves as an address card which is filed alphabetically. The changes in address are noted on this card, as well as the date of the last report.

The details necessary for compiling the statistics in regard to condition on discharge are transferred from the history sheets to a second card (three by five inches also). These cards vary in color to indicate the stage on admission (pink for incipient, white for moderately advanced, salmon for far

advanced, and green for non-tuberculous or non-pulmonary cases). Inasmuch as only the ultimate and not the immediate results are under discussion, only the details in regard to the latter condition will be mentioned. Space is provided on these cards for noting the state of health, the occupation, and the residence for ten years. These cards are filed numerically.

It is unnecessary to mention that in any statistical work cards are almost a necessity, and the amount of time saved by their use is enormous.

Each patient is written to on the anniversary of the month of his discharge. Another series of cards indicates the patients to whom reports should be sent in each month, and an attempt is made to equalize these numbers to some extent. The annual reports should be brief, but should include the following points: Name, present and permanent addresses, present work, state of health in comparison with state on discharge, presence or absence of cough, expectoration, pleurisy, night-sweats, hemoptysis, shortness of breath, elevation of temperature (degree and length of time), relapse, and of other illnesses; sputum examination, name of physician, names and addresses of other patients. With the report an annual letter is also sent, in which an attempt is made to keep up the patient's interest in the institution. If at the end of two months the report be not returned, a second report with a more urgent letter is sent, and usually the reply is returned immediately.

When the reports are returned, the condition of the patient is classified, and the information is copied into a ledger as well as upon the cards previously mentioned, the receipt is noted upon the address card, and the address checked up. The reports are filed numerically, the latest report for each patient being placed on top. Many patients change their addresses and fail to notify us of this fact, and then the value of obtaining the addresses of some friend, the physician, or club is emphasized. When notice of the death of a patient reaches us, we send a blank to the family asking for details in regard to the date, place, and cause of death, as well as the name and address of the patient's physician. He is then asked in detail about the primary and immediate cause of death, the presence or absence of complications, of nephritis, of cerebral symptoms, and also whether the death was caused by asthenia, asphyxia, syncope, hemoptysis, or pneumothorax. This information is entered as before, and the patient's name crossed off the monthly mailing cards.

The detail in connection with this work is not inconsiderable, as the physician in charge of it must write many letters and answer many inquiries about old friends and many other details. One man, however, can easily do the work necessary for keeping in touch with about 3000 to 4000 discharged patients.

Results at Other Sanatoriums.—Before discussing in detail the results at

the Adirondack Cottage Sanitarium, I would like to refer briefly to results at a few other institutions. In America only three sanatoriums have published records that can be used in this connection—the Sharon, the Muskoka Cottage, and the Massachusetts State Sanatoriums. Diagrams have been arranged to show the living and dead at a stated interval after discharge for these sanatoriums. The records at the Sharon Sanatorium deal only with patients discharged with their disease "arrested" (see Fig. 1), and the results are excellent.* The same facts hold true of the Massachusetts State Sanatorium for a period of six years (Fig. 2), while for the Muskoka Cottage Sanatorium the results for five years for patients discharged apparently cured and arrested are not quite so favorable (Fig. 3).

In his recent report to the Local Government Board, Bulstrode, of England, has carefully reviewed all the statistics of the English sanatoriums bearing upon this point. He has also discussed the results of the German sanatoriums, and I will give you charts only of the results obtained at Weicker's Krankenheim at Goerbersdorf. A glance at these charts (Figs. 4 to 7) shows the great difference in the ultimate results between those able and those unable to work on discharge from the sanatorium. Koehler recently reported in tuberculosis that 60 per cent. after two years and 55 per cent. after four years of all patients treated at Holsterhausen were still fully able to work.

Results at the Adirondack Cottage Sanitarium.—The study of the ultimate results was begun at the Adirondack Cottage Sanitarium in 1902, seventeen years after the discharge of the first patient. The earlier records are very incomplete, and many contain no addresses of patients. Some idea of this may be obtained when it is known that 36 per cent. of the first 300 patients are untraced and only 10 per cent. of the last 2400. Every attempt is being made to complete our records, and we hope before long to have data upon which we can base a discussion of the number of years each patient has been or was able to work after his discharge.

At the Adirondack Cottage Sanitarium the records cover a period of twenty-three years, but inasmuch as only those patients are dealt with who have been discharged from the sanatorium at least one year, these statistics may roughly be said to cover about twenty years. In former papers† these figures have been discussed from several different standpoints, and it

* More recent figures give insufficient details.

† "An Analysis of 1500 Cases of Tuberculosis Discharged from the Adirondack Cottage Sanitarium from Two to Eighteen Years Ago," Lawrason Brown, Jr. Am. Med. Assn., Nov. 21, 1903.

"The Post-discharge Mortality Among the Patients of the Adirondack Cottage Sanitarium," Lawrason Brown and E. G. Pope, Am. Med., 1904, viii. 879.

"The Ultimate Test of the Sanatorium Treatment of Pulmonary Tuberculosis and its Application to the Results Obtained in the Adirondack Cottage Sanitarium," Lawrason Brown and E. G. Pope, Ztschr. f. Tb., 1908, xii, 206.

is not my purpose here to enter into a detailed discussion but to give you briefly our results. If the general population be taken as a measure of

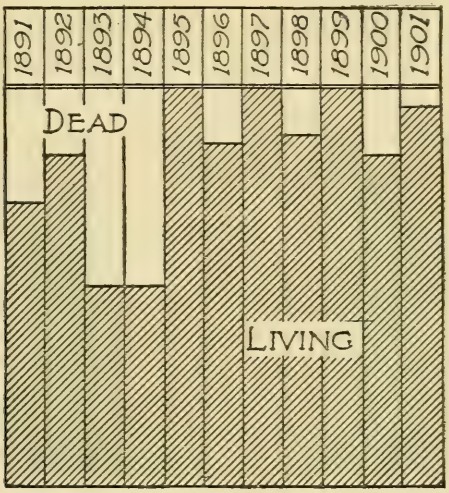

Fig. 1.—Proportions of dead and living in 1902 of those discharged "arrested" in each year from the Sharon Sanatorium.

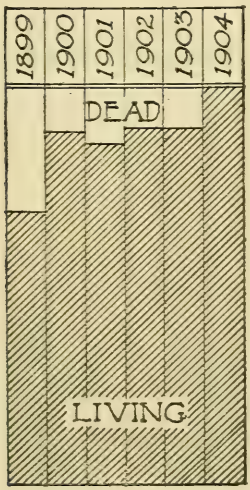

Fig. 2.—Proportions of dead and living in 1905 of those discharged "arrested" in each year from the Massachusetts State Sanatorium.

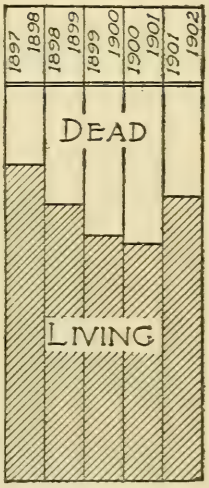

Fig. 3.—Proportions of dead and living in 1905 of those discharged apparently cured and arrested in each year from the Muskoka Cottage Sanatorium.

what should be expected, it is found for those discharged apparently cured that at the end of five years 94 per cent. of the expected are alive, at the end

of ten years 86 per cent., and at the end of fifteen years, 89 per cent. These

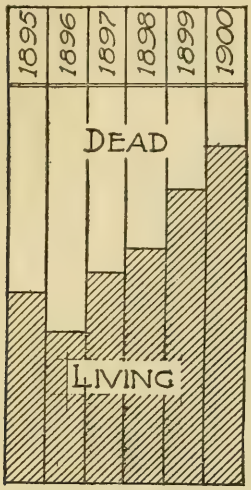

Fig. 4.—Proportions of dead and living in 1901 of those discharged in each year from Weicker's "Krankenheim."

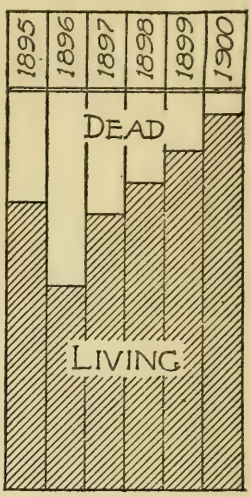

Fig. 5.—Proportions of dead and living in 1901 of those discharged able to work in each year from Weicker's "Krankenheim."

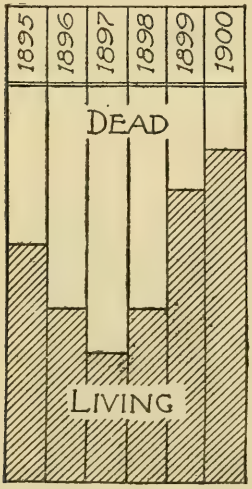

Fig. 6.—Proportions of dead and living in 1901 of those discharged partly able to work in each year from Weicker's "Krankenheim."

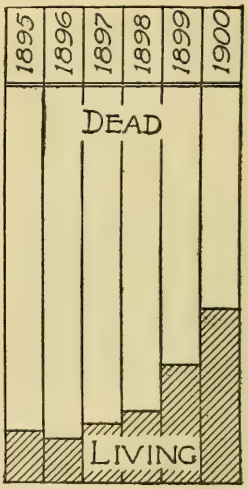

Fig. 7.—Proportions of dead and living in 1901 of those discharged unable to work in each year fromWeicker's "Krankenheim."

patients have, then, a death-rate at first twice, later about three times, that of the general population—a figure which is reduced after eight to ten years.

In fact, from the eleventh to the twentieth years inclusive after discharge the average death-rate for these patients is 5.9 per 1000, or only one-third to one-half of the expected death-rate, *i. e.*, the death-rate among the general population. The data, however, upon which this rate rests are too small to afford any considerable degree of approximation, as only one death is known to have occurred among them, and there are nine deaths for which no date can be obtained. The occurrence of one or two deaths during this period would greatly change the rate for this period (eleventh to seventeenth years). It can be said, however, that the weeding out of the patients and the hygienic life which they have learned to live may in part account for the very low death-rate.

In Table I the cases are divided into the three stages on discharge, apparently cured, arrested, and active. They are then grouped into smaller divisions according as they have been discharged from one to two, from two to three, etc., years. The death-rate per 1000 of the general population (Farr Life Table No. 3) is found in the second column. Under each condition on discharge are to be seen the number of patients exposed to risk of death, the number of deaths,* and the death-rate per 1000 for the several years after discharge.

The patients discharged with their disease arrested (that is, without the occurrence of fever or other symptoms, suggesting activity in the process, but whose sputum often contained tubercle bacilli) present far less favorable results after the same lapse of time. At the end of five years, using the same comparison, only 62 per cent. are alive, while at the end of ten and fifteen years the percentages are 48 and 42 respectively. The death-rate at first is about five times, then rises in the third year to about ten times, that of the general death-rate, but afterward falls steadily, as far as our experience goes, but is probably always somewhat higher than the death-rate among those discharged apparently cured. From the tenth to the seventeenth years inclusive the average death-rate is three to four times the expected death-rate, or 50.5 per 1000.

Of all patients discharged with their disease neither apparently cured nor arrested, or, as I have termed it, active, only 25 per cent. are alive at the end of five years, 15 per cent. at the end of ten, and 10 per cent. at the end of fifteen years after discharge. The death-rate at first is very large,—about forty times that of the general population,—but it rapidly decreases, and from the tenth to the seventeenth years inclusive the average death-rate is only six to seven times the expected death-rate. It is thus seen that it remains over twice that of those apparently cured and nearly twice that of those with arrested disease.

* About a number of deaths no definite information in regard to the exact date of death could be obtained, and these deaths have been allotted pro rata.

These results have been graphically expressed in Figs. 8 to 13. In Dia-

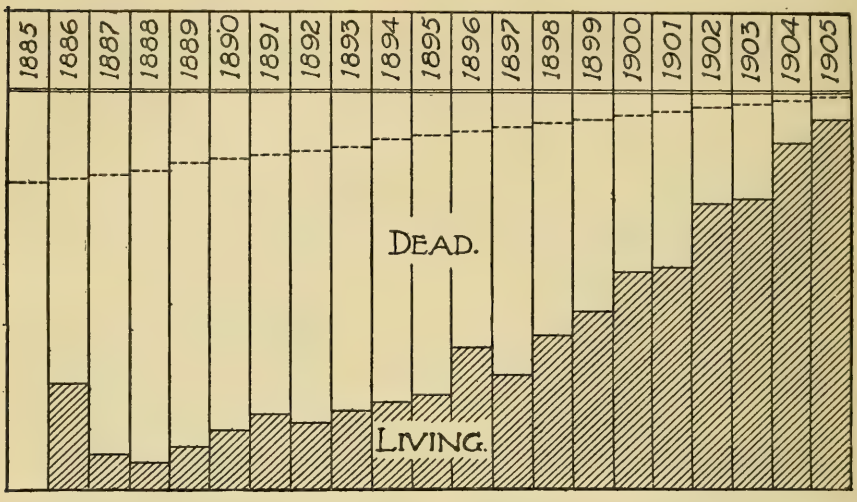

Fig. 8.—Proportions of dead and living in 1906 of all those discharged in each year from the Adirondack Cottage Sanitarium. The broken line shows the proportions (above dead, below living) according to a general mortality table (Farr, No. 3).

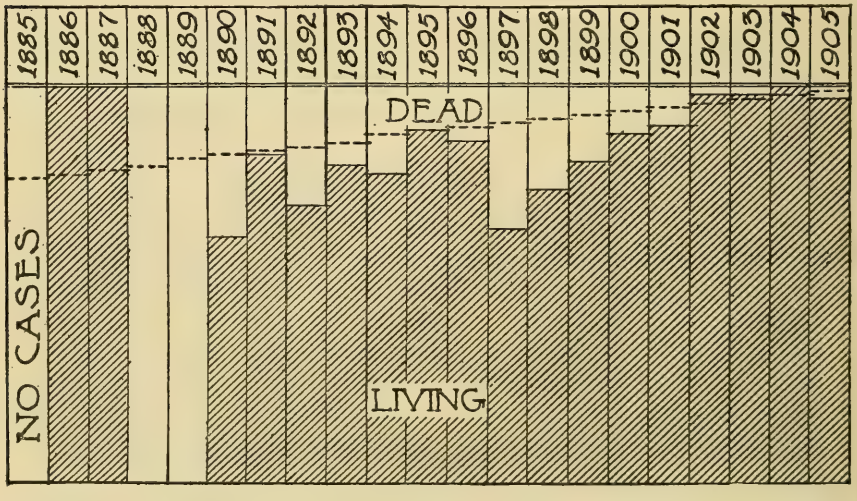

Fig. 9.—Proportions of dead and living in 1906 of those discharged apparently cured in each year from the Adirondack Cottage Sanitarium. The broken line shows the proportions (above dead, below living) according to a general mortality table (Farr, No. 3).

gram I the results after the eighth year are, of course, much less reliable, and the same is true of Diagram II.

As the system of annual reports was introduced at the Adirondack

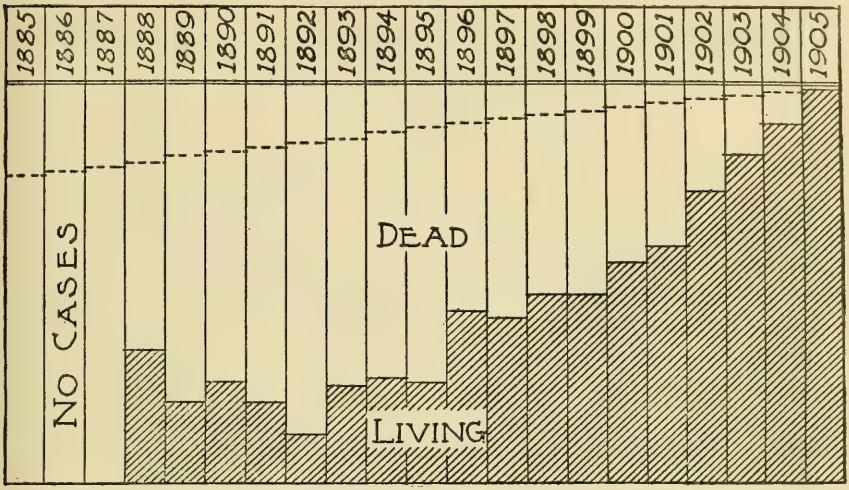

Fig. 10.—Proportions of dead and living in 1906 of those discharged arrested in each year from the Adirondack Cottage Sanitarium. The broken line shows the proportions (above dead, below living) according to a general mortality table (Farr, No. 3).

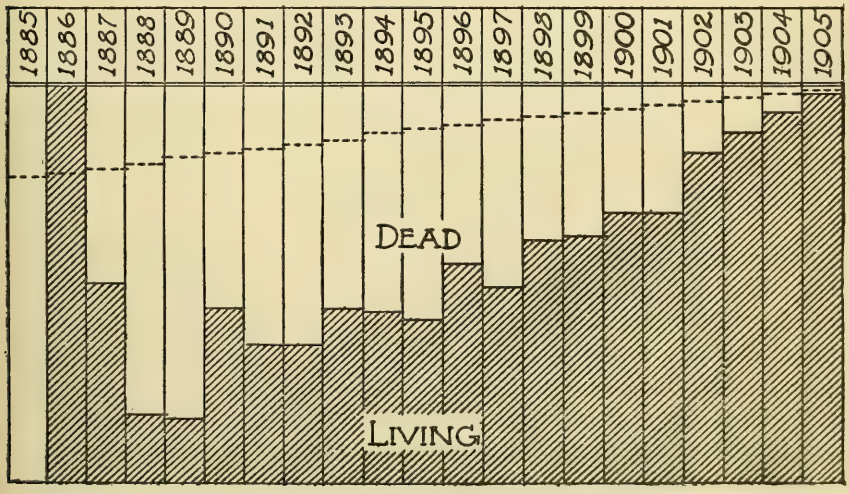

Fig. 11.—Proportions of dead and living in 1906 of those discharged apparently cured and arrested in each year from the Adirondack Cottage Sanitarium. The broken line shows the proportions (above dead, below living) according to a general mortality table (Farr, No. 3).

Cottage Sanitarium only in 1902, no data are yet at hand bearing upon the work of our patients previous to this period. Consequently, while it is

hoped that this deficiency will soon be supplied, the only figures at present

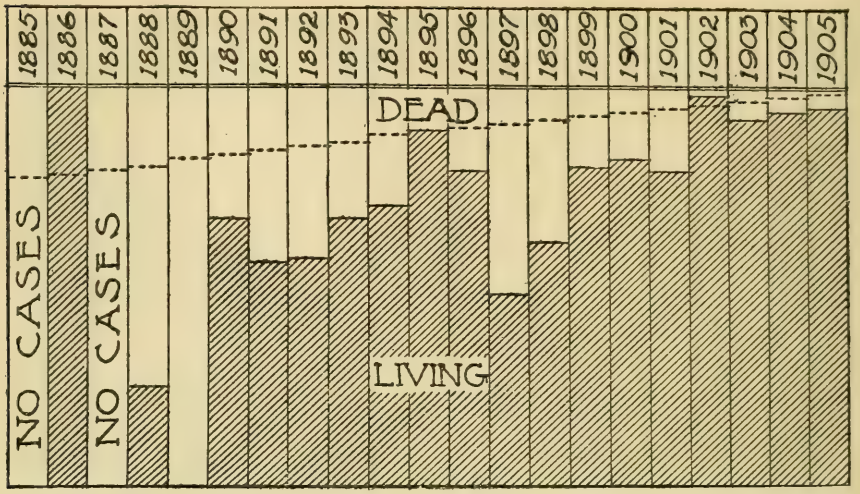

Fig. 12.—Proportions of dead and living in 1906 of all patients admitted in the incipient stage, for each year, at the Adirondack Cottage Sanitarium. The broken line shows the proportions (above dead, below living) according to a general mortality table (Farr, No. 3).

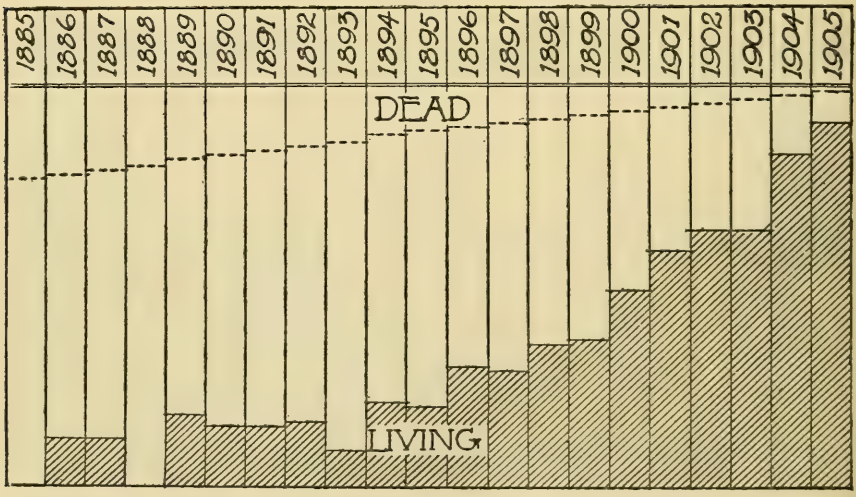

Fig. 13.—Proportions of dead and living in 1906 of all patients admitted in the moderately advanced stage, for each year, at the Adirondack Cottage Sanitarium. The broken line shows the proportions (above dead, below living) according to a general mortality table (Farr, No. 3).

available deal with those who are at present alive. There are 1209 patients known to be living out of 2553. Of these, 1058, or 41 per cent. of the whole,

are engaged in or able to do some work. Less than 353 of all the patients remain untraced, and if we consider the 2200 patients about whom definite

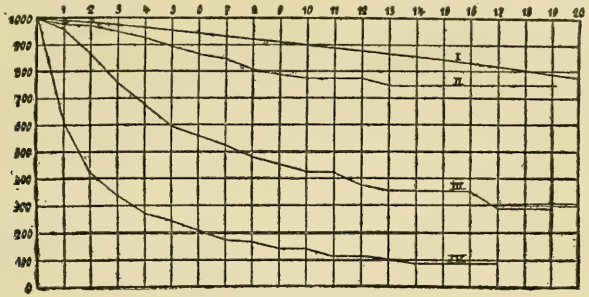

Diagram I.—Showing the numbers surviving at the end of each year out of: I, 1000 persons in the general population; II, 1000 discharged apparently cured from the Adirondack Cottage Sanitarium; III, 1000 discharged "arrested" from the Adirondack Cottage Sanitarium; IV, 1000 discharged with disease active from the Adirondack Cottage Sanitarium.

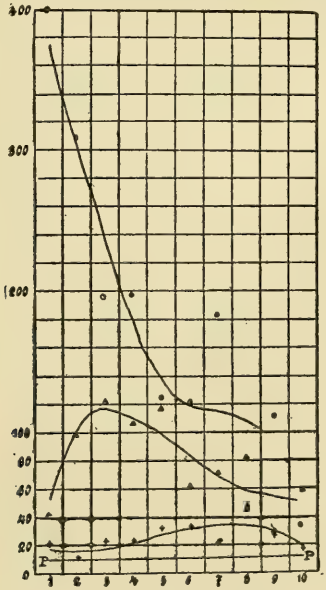

Diagram II.—Showing the death-rates per thousand for the first ten years from the apparently cured +, the arrested △, and the active ⊙. The continuous curves are roughly approximate graduations of the actual rates as shown by the points. The line marked P shows corresponding death-rates for the general public.

information is at hand, we find that after a lapse of one to twenty-three years at least 48 per cent. of the traced patients are able to work. Of the remainder of the 1209 patients, 107, or 8.8 per cent., are doing nothing, and

about 44, or 3.6 per cent., no information has been obtained in regard to their working capacity. So out of the 1209 patients alive, 87.5 per cent. are still able to work.

A list of 63 patients who have been discharged from fifteen to twenty-three years ago is to be found in Table No. II.

A study has been made in regard to the residences of the living patients on admission and at present. The only conclusion so far arrived at is that the shifting of residence is such that the number living in small places is almost unchanged, while the increase of the number living in health resorts is but little larger than the decrease in the number living in large cities.

It may be stated that whereas given two patients in the same stage, the one accustomed to the luxuries of life, the other hardly to the bare necessities at times, the former during sanatorium residence may not do as well as the latter, but the latter will, as a rule, do far less well eventually, as in most cases he must work, ill or well, after his discharge from the sanatorium. Consequently it is difficult to compare the ultimate results of sanatoriums unless they treat patients in the same class financially.

TABLE No. I.

Year after Discharge.	Death-rate per 1000 of General Population (Farr, No. 3).	Condition on Discharge.								
		Apparently Cured.			Arrested.			Active.		
		Exposed to Risk of Death.	Deaths.	Death-rate per 1000.	Exposed to Risk of Death.	Deaths.	Death-rate per 1000.	Exposed to Risk of Death.	Deaths.	Death-rate per 1000.
1..	9.9	462.00	9.44	20.4	836.00	43.83	52.4	698.00	276.94	396.8
2..	10.1	409.56	4.72	11.5	689.17	68.71	99.7	397.06	122.67	308.9
3..	10.3	368.84	8.26	22.4	520.46	63.97	122.9	258.39	50.58	195.8
4..	10.5	316.58	7.08	22.4	386.49	41.47	107.3	179.81	35.40	196.9
5..	10.7	260.50	8.26	31.7	282.02	33.18	117.7	121.41	15.17	125.0
6..	11.0	216.24	7.08	32.7	193.84	11.85	61.1	94.24	11.38	120.8
7..	11.2	169.16	3.54	20.9	145.99	10.67	73.1	75.86	13.91	183.4
8..	11.5	125.62	5.90	47.0	101.32	8.29	81.8	54.95	2.53	46.0
9..	11.7	88.72	2.36	26.6	78.03	2.37	30.4	44.42	5.06	113.9
10..	12.0	70.36	1.18	16.8	59.66	3.56	59.7	36.36	1.26	34.7
11..	12.3	52.18	0.00	0.0	36.10	0.00	0.0	31.10	6.32	203.2
12..	12.6	45.18	0.00	0.0	29.10	3.56	122.3	17.78	0.00	0.0
13..	12.9	35.18	1.18	33.5	22.54	1.18	52.4	13.78	1.26	91.4
14..	13.3	24.00	0.00	0.0	14.36	0.00	0.0	10.52	0.00	0.0
15..	13.7	16.00	0.00	0.0	12.36	0.00	0.0	8.52	1.26	147.9
16..	14.1	10.00	0.00	0.0	7.36	0.00	0.0	5.26	0.00	0.0
17..	14.5	5.00	0.00	0.0	6.36	1.18	185.5	3.26	1.26	386.5
18..	15.0	4.00	0.00	0.0	3.18	0.00	0.0	....	....	....
19..	15.5	4.00	0.00	0.0	1.18	0.00	0.0	....	....	....
20..	16.0	3.00	0.00	0.0	1.18	1.18	1000.0	....	....	....

In conclusion it may be stated: (1) that the terms living and dead admit of no ambiguity; (2) that it is an important duty of every sanatorium to

keep in touch with its former patients; (3) that at the Adirondack Cottage Sanitarium the patients discharged apparently cured have a death-rate two to three times, the patients with disease arrested ten to five times, the patients discharged with active disease forty to seven times, that of the general population; (4) that 41 per cent. of all the patients discharged are able to work one to twenty-three years after discharge; (5) that 87.5 per cent. of all the patients alive are able to work; (6) that the shifting of residence occurs less frequently than is to be expected; and (7) that the health resorts as a residence gain in numbers at the expense of the large cities.

Ultimos Resultados del Tratamiento en los Sanatorios.—(BROWN.)

Este articulo representa el estudio hecho sobre la condición del paciente después que este ha dejado el sanatorio, el período de tiempo varía entre dos y veinte y tres años. Se hace una consideración detallada sobre el resultado final, la importancia económica y de los métodos empleados en la colección de las estadísticas en el Adirondack Cottage Sanitarium. Al paciente se le escribe cada año y también es requerido de contestar, no solamente sobre su condicion sino que tambien sobre la condicion de otros pacientes de los cuales el tiene conocimiento. Se concidera ligeramente los resultados de otros sanatorios. De los primeros 300 pacientes del Adirondack Cottage Sanitarium, de 36% no se sabe de ellos y solamente 10% de los ultimos 2400. De 2553 pacientes, 1209 viven a la fecha y de estos 1058 ó sea un 41% se encuentran desempeñando empleos ó son capaces de trabajar. Trecientos cincuenta y tres de estos pacientes no se sabe el padradero de ellos y conciderando solamente 2200 de los cuales se sabe, 48% estan en condición de dedicarse al trabajo. De los 1209 pacientes que aun viven, 87.5% son capaces de trabajar. El artículo tambien hace referencia a una lista de 63 pacientes que se les dió de baja hace ya de quince a veinte años. Se hace un estudio sobre la residencia de los pacientes vivos al tiempo de admisión y al presente. La sola conclusión hasta el presente es, que los cambios de residencia son tales, que el número de los que viven en ciudades pequeñas permanece invariable, mientras que el aumento en el numero de los que viven en lugares sanos es de poca significación comparado con el número relativamente pequeño de los que viven en las grandes ciudades. Cuando se recuerda que por cincuenta años nadie pensaba siquiera en la cura de la tuberculosis pulmonar, resultados tales como estos dan mucha esperanza.

Les résultats définitifs du traitement de sanatorium.—(BROWN.)

L'auteur étudie l'état des malades après leur départ du sanatorium,—un an jusqu'à vingt-trois ans après. Discussion sur la valeur des résultats

TABLE No. II.

A List of 63 Patients Living in 1908, Fifteen to Twenty-three Years After Treatment.

Sex.	Age at Discharge.	Number of Years Since Discharge.	Condition.			Occupation.		Residence.	
			Admission.	Discharge.	1908.	Previous.	Present.	Previous.	Present.
M.	29	23	Incip.	Ap. cured.	Well.	Drug clerk.	Druggist.	Jersey City, N. J.	New York, N. Y.
F.	26	22	Incip.	Ap. cured.	Well.	....	Housewife.	Southington, Conn.	Southington, Conn.
F.	25	21	Mod. adv.	Ap. cured.	Well.	Organist.	Housewife.	....	Bermuda, W. I.
F.	25	20	Incip.	Arrested.	Well.	Housework.	Colporteur.	New Haven, Conn.	New Haven, Conn.
M.	21	19	Mod. adv.	Arrested.	Well.	Clerk.	Hotel mgr.	Pittsfield, Mass.	Pittsfield, Mass.
F.	41	19	Mod adv.	Improved.	Well.	Shopper.	Physical culture.	Ogdensburg, N. Y.	Ogdensburg, N. Y.
M.	37	19	Mod. adv.	Arrested.	Well.	....	Real estate.	Clinton, Ill.	Clinton, Ill.
M.	30	19	Mod. adv.	Improved.	Well.	Brakeman.	R. R. conductor.	Harrisburg, Pa.	Harrisburg, Pa.
M.	21	19	Incip.	Ap. cured.	Well.	Engraver.	Engraver.	....	Denver, Col.
F.	17	18	Incip.	Ap. cured.	Well.	Mill hand.	Stenographer.	New London, Conn.	New York, N. Y.
F.	22	18	Incip.	Ap. cured.	Well.	Trained nurse.	Housewife.	Staten Island, N. Y.	Auburn, N. Y.
M.	18	18	Mod. adv.	Improved.	Well.	Bank clerk.	Bank clerk.	New York, N. Y.	Montclair, N. J.
M.	31	18	Mod. adv.	Ap. cured.	Well.	Clerk.	Trav. salesman.	New York, N. Y.	New York, N. Y.
M.	21	18	Incip.	Ap. cured.	Arrested.	Bookkeeper.	Trav. outdoors.	New York, N. Y.	Schenectady, N. Y.
F.	25	18	Mod. adv.	Arrested.	Well.	Teacher.	Teacher.	New York, N. Y.	New York, N. Y.
F.	25	18	Mod. adv.	Ap. cured.	Well.	Trained nurse.	Trained nurse.	New York, N. Y.	New York, N. Y.
F.	35	18	Incip.	Ap. cured.	Well.	Seamstress.	Housewife.	New York, N. Y.	Spokane, Wash.
F.	24	17	Incip.	Ap. cured.	Well.	None.	Housewife.	New York, N. Y.	Fitchburg, Mass.
F.	29	17	Mod. adv.	Arrested.	Well.	Teacher.	Housewife.	Providence, R. I.	Denver, Colo.
F.	32	17	Mod. adv.	Arrested.	Well.	Teacher.	Teacher.	New York, N. Y.	New York, N. Y.
F.	23	17	Mod. adv.	Ap. cured.	Well.	Nurse.	Nurse.	New York, N. Y.	New York, N. Y.
F.	45	17	Mod. adv.	Arrested.	Well.	Organist.	Housewife.	New York, N. Y.	Buffalo, N. Y.
M.	38	17	Mod. adv.	Improved.	Chronic.	Student.	Priest.	New York, N. Y.	Palensville, N. Y.
F.	32	17	Incip.	Arrested.	Chronic.	Maid.	Sewing.	New York, N. Y.	Morristown, N. J.
M.	30	17	Mod. adv.	Ap. cured.	Well.	Cooper.	Clerk.	Brooklyn, N. Y.	Brooklyn, N. Y.
M.	19	17	Far adv.	Unimproved.	Chronic.	Clerk.	Telegrapher.	New York, N. Y.	Lake Placid, N. Y.
F.	29	17	Mod. adv.	Unimproved.	Well.	None.	Housekeeper.	Batavia, N. Y.	Ithaca, N. Y.

M.	28	17	Mod. adv.	Ap. cured.	Well.	Salesman.	Mfgrs.' agent.	Baltimore, Md.	Baltimore, Md.
M.	22	17	Mod. adv.	Arrested.	Arrested.	Physician.	Clergyman.	Trappe, Md.	Easton, Md.
F.	21	17	Incip.	Ap. cured.	Well.	None.	Housekeeping.	Brooklyn, N. Y.	New York, N. Y.
F.	17	17	Incip.	Ap. cured.	Well.	None.	Housewife.	Tomkinsville, N. Y.	Stapleton, N. Y.
F.	24	17	Incip.	Ap. cured.	Well.	Nurse.	Housework.	Dobbs' Ferry, N. Y.	Dobbs' Ferry, N. Y.
F.	30	17	Mod. adv.	Unimproved.	Well.	None.	Masseuse.	Buffalo, N. Y.	Buffalo, N. Y.
M.	24	16	Mod. adv.	Arrested.	Well.	Clerk.	Real estate.	New York, N. Y.	New York, N. Y.
F.	13	16	Mod. adv.	Ap. cured.	Well.	Schoolgirl.	Housewife.	New York, N. Y.	Elizabeth, N. J.
F.	19	16	Incip.	Ap. cured.	Well.	Housework.	Housewife.	New York, N. Y.	Eaglewood, N. J.
M.	29	16	Incip.	Improved.	Well.	Pattern-maker.	Store man'g'r.	Southington, Conn.	Southington, Conn.
M.	30	16	Mod. adv.	Ap. cured.	Well.	Bookkeeper.	Warehouseman.	New York, N. Y.	New York, N. Y.
F.	23	16	Incip.	Ap. cured.	Well.	Singer.	Housewife.	New London, Conn.	Lakewood, N. J.
F.	26	16	Incip.	Ap. cured.	Well.	Saleswoman.	Housekeeper.	New York, N. Y.	Sanbury, Conn.
F.	25	16	Mod. adv.	Ap. cured.	Well.	Teacher.	Housewife.	Philadelphia, Pa.	Saranac Lake, N. Y.
F.	25	16	Mod. adv.	Ap. cured.	Well.	Housework.	Housewife.	Montreal, P. Q.	Montreal, P. Q.
F.	40	16	Mod. adv.	Arrested.	Chronic.	Teacher.	None.	Brooklyn, N. Y.	Brooklyn, N. Y.
F.	21	16	Mod. adv.	Ap. cured.	Well.	Stenographer.	Secretary.	Brooklyn, N. Y.	Denver, Colo.
M.	22	16	Incip.	Arrested.	Well.	Clerk.	Clerk.	New York, N. Y.	New York, N. Y.
F.	28	16	Mod. adv.	Improved.	Well.	Housekeeper.	....	Brooklyn, N. Y.	Brooklyn, N. Y.
F.	11	16	Mod. adv.	Unimproved.	Well.	None.	Housewife.	Springfield, Mass.	New York, N. Y.
F.	26	15	Incip.	Ap. cured.	Well.	Clerk.	Physician.	New York, N. Y.	Brooklyn, N. Y.
F.	23	15	Incip.	Ap. cured.	Well.	Trained nurse.	Housewife.	Brooklyn, N. Y.	Brooklyn, N. Y.
F.	27	15	Incip.	Arrested.	Well.	Trained nurse.	Housewife.	Portsmouth, R. I.	Newport, R. I.
M.	26	15	Incip.	Ap. cured.	Well.	Salesman.	Steward.	New York, N. Y.	Lakewood, N. J.
M.	23	15	Incip.	Ap. cured.	Well.	Clerk.	Real estate.	New York, N. Y.	New York, N. Y.
F.	33	15	Incip.	Ap. cured.	Well.	Dressmaker.	Housekeeper.	Lake Coneo, N. J.	Lake Coneo, N. J.
F.	24	15	Incip.	Ap. cured.	Well.	Teacher.	Teacher.	Baltimore, Md.	Baltimore, Md.
M.	45	15	Incip.	Improved.	Well.	Clergyman.	Clergyman.	....	Paterson, N. J.
M.	28	15	Incip.	Arrested.	Well.	Physician.	Physician.	Washington, D. C.	Saranac Lake, N. Y.
F.	36	15	Mod. adv.	Ap. cured.	Well.	Teacher.	Teacher.	Brooklyn, N. Y.	Pasadena, Cal.
F.	40	15	Mod. adv.	Arrested.	Chronic.	Housework.	None.	Springfield, Mass.	Craydon, N. H.
F.	35	15	Mod. adv.	Ap. cured.	Well.	Housework.	Housewife.	Poultney, Vt.	Poultney, Vt.
M.	26	15	Far adv.	Arrested.	Well.	Tailor cutter.	Cloak-cutter.	New York, N. Y.	New York, N. Y.
M.	21	15	Incip.	Ap. cured.	Well.	Clerk.	Clerk.	New York, N. Y.	Up. Montclair, N. J.
M.	34	15	Mod. adv.	Improved.	Well.	Fruit dealer.	Helper.	Colwes, N. Y.	Saranac Lake, N. Y.
F.	27	15	Incip.	Arrested.	Well.	Housework.	Housewife.	New York, N. Y.	New York, N. Y.

finaux, leur importance économique; détails sur la méthode employée pour obtenir ces statistiques au "Adirondack Cottage Sanitarium." On écrit tous les ans au malade et on lui demande de correspondre avec le sanatorium, et de lui communiquer, non seulement des informations sur sa personne, mais aussi sur d'autres malades qu'il connaît.—Examen très-bref des résultats obtenus aux autres sanatoria. Sur les premiers 300 malades du "Adirondack Cottage Sanitarium," 36% n'ont pas pu être retrouvés, mais sur les derniers 2400 on a perdu les traces de 10% seulement. Sur les 1209 malades connus parmi les 2553 anciens habitants du Sanatorium, 1058 ou 41% sont occupés à faire un travail quelconque ou bien sont capables d'en faire un.—353 des malades ont été perdus de vue; si nous ne comptons que les 2200 dont l'état est connu, nous trouvons 48% capables de travailler. —Sur les 1209 malades en vie, 87.5% sont encore capables de travailler.— Liste de 63 malades vivants, qui ont quitté le sanatorium il y a 15 à 23 ans. Étude concernant les endroits où demeuraient les malades vivants avant d'entrer au sanatorium et où ils demeurent maintenant. La seule conclusion à laquelle on soit arrivé qusqu'à présent est que le nombre de malades demeurant dans de petites villes n'est presque pas changé, tandis que l'augmentation du nombre de ceux qui demeurent dans des sanatoria n'est qu'un peu plus grande que la diminution du nombre de ceux qui résident dans de grandes villes.—Si l'on se rappelle qu'il y a cinquante ans, on croyait que jamais les malades de tuberculose pulmonaire ne pouvaient être guéris, des résultats tels que les présents ne peuvent que nous encourager.

Endresultate der Sanitariums-Behandlung.—(Brown.)

In diesem Artikel ist eine Untersuchung des Zustandes der Patienten nachdem sie das Sanitarium verlassen haben, und zwar für einen Zeitraum von 1 bis zu 23 Jahren gemacht worden. Die Erörterung des Wertes der Endresultate, ihrer ökonomischen Bedeutung und der Methode, um solche statistischen Data in dem Adirondack Cottage Sanitarium zu erhalten, ist sehr eingehend. Jedes Jahr wird an den Patienten geschrieben, und er wird dringend aufgefordert, nicht nur über sich selbst, sondern auch über andere Patienten, von denen er etwas weiss, zu schreiben. Die Resultate in anderen Sanitarien sind kurz erwähnt. Von den ersten 300 Patienten in dem Adirondack Cottage Sanitarium könnten 36% nicht gefunden werden, und von den letzten 2400 nur 10%; von den 1209 Patienten, von denen man weiss, dass sie leben, aus einer Anzahl von 2553, 1058, oder 41%, des Ganzen sind in irgend einer Weise arbeitsfähig. Dreihundert fünfunddreissig dieser Patienten sind nicht auffindbar und wenn wir nur die 2200 auffindbaren betrachten, so sind 48% arbeitsfähig. Von den 1209 lebenden Patienten sind 87.5% noch arbeitsfähig. Der Artikel bringt auch eine Liste von 63

lebenden Patienten, die schon 15 bis 23 Jahre entlassen sind. Ein Studium in Bezug auf die Wohnungen der lebenden Patienten zur Zeit der Zulassung und der Gegenwart wurde veranstaltet. Der einzige Schluss, den man bis jetzt erreichen konnte, ist, dass der Wohnungswechsel ein derartiger ist, dass er bei den in kleinen Städten wohnenden Patienten unverändert ist, während die Zunahme der in Kurorten Wohnhaften nur sehr wenig grösser ist, als die Abnahme in der Zahl der in grossen Städten Wohnhaften. Wenn man in Erwägung zieht, dass vor 50 Jahren von keinem Lungenkranken erwartet wurde, dass er von der Schwindsucht geheilt werden könnte, sind Erfolge dieser Art sehr ermutigend.

DISCUSSION.

Dr. Williams (London, England) wished to compliment the readers of the interesting papers in the symposium on a subject which to him was the most important before the Congress. In considering the expressions of disapproval of sanatoriums which had appeared, two questions presented themselves. The first question was, "Are we putting the right cases into the sanatoriums?" At first it was thought that the sanatorium was to do everything, whereas they were meant only for one set of cases—the early ones without fever. One often sees in them advanced cases with cavities, high fever, and marked wasting. Their place is in a hospital. It is a mistake to put all kinds of cases into the sanatorium. England prides herself that she was the first country to have special hospitals for consumption. They had four hospitals in London for many years before the matter was taken up by any other country. Dr. Lawrason Brown must have included unfortunately far-advanced cases in his statistics, for his results should have been better if the inmates had been restricted to early cases. The reporter from Germany (Prof. Pannwitz), whose statistics Dr. Williams had carefully studied, showed many cases of high fever in the sanatoriums which should have been in hospitals. Febrile cases should be admitted to hospitals, and after sufficient improvement sent to sanatoriums. A frequent question on the application forms of sanatoriums is, "How far can you walk?" It should be placed on the blanks of all sanatoriums, for it indicates the patient's ability to walk, and only such as can walk should be admitted to sanatoriums. And if these cases only are admitted, the results are excellent. If hospital cases can take exercise, they should be sent to sanatoriums. This was the fortunate arrangement between Brompton and Frimley. Dr. Williams was proud of the papers read by his colleagues, Doctors Latham, Paterson, and Inman, for, as one of the oldest medical officers at Brompton, he felt responsible for the work done at its offshoot, Frimley. When they were planning the buildings at

Frimley, he insisted that a "Liegehalle" should be erected, after the fashion of the Germans. Recently, after a visit to Frimley, he discovered that the "Liegehalle" had been occupied by so few patients that it had been converted into a workshop, where the patients were engaged at shoemaking and carpentering, and thus emphasized the change which had come over the treatment in sanatoriums.

In opposition to Dr. Bridge, he wished to emphasize that the tubercle was confined to a small part of the lungs, and that it was necessary, by the work of the rest of the lungs and muscles, to improve the condition of the blood, and thus to cure the patient; in other words, the endeavor was to crowd the disease into a corner. It has been noted that often in diseased lungs the lesion could not be detected because of the surrounding emphysema, which indicates the method which nature employs to mask disease. The heart grows larger because of exercise, and the whole body becomes more vigorous because of the work. It was necessary to insist that the treatment employed by Dr. Paterson should only be employed in proper cases.

The other chief point was in regard to the establishment of labor homes. His opinion was that they were not necessary if sanatorium treatment was properly conducted as at Frimley. Patients ought to be able to return to work from the sanatorium. After observing in the patients at White Haven under the care of Dr. Flick that graduated exercise was being employed, it was his opinion that this method of treatment will be used more and more.

In conclusion he wished to say, as an old pathologist, that he could not accept all that had been said about autoinoculation at present, but that he was clearly convinced, as the result of the Congress, that sanatorium treatment was gaining and being carried forward.

Dr. Herbert DeCarle Woodcock (Leeds, England) said that he is at one with Dr. Williams in disagreement with Dr. Norman Bridge's position. This position seems to be one of special pleading, based on physiological principles, which might themselves require an exhaustive and possibly destructive criticism. The fault in sanatorium treatment for the multitude is that there is too little of it. To the workingman patient it is a sudden change from insufficiency to ideal sufficiency, and then a rapid change back to insufficiency.

If the labor colony would prolong the treatment of a working-class patient, it would be on that account a boon. But even if in some case the labor is not remunerative, it is, on moral as well as physical grounds, still a boon.

At Nordrach Dr. Walther, himself all energy, is dubious as to the value of work as a therapeutic agent. At Falkenstein work and exercise are hardly in the pharmacopeia. But at Cannet, near Cannes, Vaudremer

had projected a labor colony, injured from the want of respect to discipline shown by some of the patients.

At Edinburgh Dr. Philip is quite convinced of the necessity of work, generally speaking; in fact, his working staff (Victoria Hospital) consists almost entirely of patients, practically cured, who gradually slid into their present duties. At Kelling, near Holl, in Norfolk, all the patients do some work. It is considered that idleness is mischievous in its effect on the patient's morals. The robust patients are in the farm grounds, the joiners' shop, the house garden, and work averages five hours a day. The less robust are engaged in wood carving and even knitting.

Dr. Paterson (at Frimley) has much to admire—above all, his own genius for organization. Paterson's sanatorium is a busy hive, but there are many patients who are not working. Dr. Paterson has no fear of sterile dust, and one finds girls raking cinders in a cloud of dust. Dr. Paterson, when he puts a patient in his famous sand-pit work, stands by his side and observes the effect; in a hundred ways one sees this minute attention to persons and no dogmatism as to general principles. Hemoptysis is never met with among his workers. The fact that Dr. Paterson has the largest consumption hospital in England behind him, allowing the greatest of opportunities in the selection of his cases, is of great importance to him.

In the sanatorium at Leeds the plan may be briefly sketched as follows: All Leeds patients must attend, if able, the out-patient department of the Leeds Tuberculosis Association. Those patients unable to attend are admitted on the recommendation of the home physician. The others are examined at the out-patient room, which is centrally located in the city. Patients under personal control are all sent to the Leeds Consumption Hospital, a hospital on the confines of the city, situated in a beautiful private park, and where sanatorium methods are possible. Here the patients are under observation. The first observations are made during the bed régime: every patient is in bed a week at least. In this way one can select cases for the sanatorium, which is sixteen miles away from the city. The unsuitable cases remain at the hospital. No patient at the sanatorium is put on work until he has been tested by exercise (walking).

The temperature, pulse, respiration, and temperament are noted. Greater care is taken with excitable patients. No patient with a quick pulse is allowed manual labor. The temperature is taken by the rectum. A morning temperature and the afternoon temperature are considered of most significance. The temperature is taken early, and before the morning walk. The walk may last an hour and is briskly taken. The temperature is then taken hourly, and the same applies to the pulse and respiration. The temperature, of course, rises after the exertion. If it continues to rise

during the afternoon, or if it falls and there is a second sharp rise, rest is prescribed. If the temperature rises and falls quickly after the exertion, the patient is, other things being equal, fit for work.

A quick pulse-rate and a morning temperature of 99° save all further consideration—the patient is not allowed to walk. Respiration rate is not of great importance.

The subjective symptom of headache, etc., has not received much attention, *per se*. Such subjective sensations, if present, affect the temperature and pulse-rate.

Hemoptysis is our great fear. As every one knows, a man may have a hemoptysis when he is apparently perfectly well. One of our patients, the most robust of our lot, had a slight hemoptysis when bending over a spade in the garden work.

But if the sputum is tinged; if the sputum is excessive; if the patient has a quick pulse; if the patient is excitable; and if the patient has excessive signs and fewer symptoms, but is rapidly, very rapidly gaining weight, we look for hemoptysis; especially is this so when the symptoms include a rapid pulse-rate. Dr. Gordon, one of Dr. Philip's lieutenants, says that a sudden increase of weight in a man with a cavity always makes him cautious.

Every patient is seen by the house physician before he goes to his work, and every patient during his first few days of work has the temperature and pulse and respiration registered hourly during the working hours and beyond. This is a matter of routine.

Even with all these precautions, a case may astonish one; but on looking backward, one generally is able to recognize some lack of care, some suspicious symptoms, which had been overlooked. It is quite impossible, in a sanatorium fed by one town, to exclude all febrile cases. Some febrility is not a bar to the entry to our sanatorium. Sometimes the patient ceases to improve after three months, and then improves when allowed to leave, especially if he has gone to other hygienic surroundings. A seaside sojourn as a sequel to the sanatorium treatment does much good.

Dr. R. W. Philip (Edinburgh) said that he agrees entirely with the views of Drs. Latham and Paterson. The sanatorium has revolutionized the treatment of tuberculosis. In early cases the results are nearly perfect.

As to the question of the relative importance of rest and work in treatment, it seemed to him there has been some misunderstanding; that there were not really two opposing schools of thought. He believes that all are agreed that under conditions of physiological depression, rest is absolutely necessary. Such depression is evidenced and diagnosed rather by consideration of the systemic condition than by the local or pulmonary manifestations. In this connection he wishes to take exception to the arbitrary

classification into stages I, II, and III, when these are based on anatomical changes characterizing different degrees of pulmonary lesion as discovered by physical signs. Classification ought to be based chiefly on physiological grounds. Not infrequently a condition of advanced disease is indicated by signs of systemic disturbance which, on the anatomical basis, would seem to belong to the first or incipient class, and contrariwise.

As to the question of work in the treatment of tuberculosis, he emphasizes the fact that the disease is always accompanied by a definite degree of muscular dystrophy. Realizing this, he and others have for many years insisted that some graded activity is advisable. In the sanatorium with which he is connected they have developed a system of graded work which is of the greatest benefit to the patients—a benefit which is seen especially in the quality of muscle, rather than in mere gain in weight. This is evident not merely in the muscles of the trunk and extremities, but also in an improved condition of the circulation and of the gastro-intestinal tract, which in both instances is largely an expression of improved muscle tonicity. From this point of view he desires to commend the extremely fine bit of work achieved by Dr. Paterson.

He is obliged to differ with Dr. Theodore Williams in his remark concerning the lack of need for a working colony. It is true that up to a certain point the system of graded labor could prepare the patients for a resumption of their former work upon discharge. But there would always remain a residual group of patients who cannot safely be sent back directly to their former occupation. For this class, and this class alone, the working colony is a necessity. So strongly do they believe in this in Edinburgh that, in addition to the sanatorium, with its working possibilities, they are arranging a tract of land on which selected patients discharged from the sanatorium can continue to do farm labor, the produce of which, as garden and other supplies, may be sent back to the sanatorium as a reciprocal benefit.

Dr. King (Liberty, N. Y.) wished to speak concerning two points in the question of graded work in sanatoriums. First, concerning the rise of temperature which follows such work: he makes the distinction that a fever which appears immediately after such work and is transitory, lasting only from twenty to thirty minutes, then disappearing, is often seen in normal individuals, and should not be taken as a contraindication to the treatment in question. Such a fever does not represent an autoinoculation. He at first made the mistake of attaching importance to this fever, and unnecessarily interrupted the course of the graded exercises.

He agrees with the points made by Dr. Latham regarding the cost of construction and maintenance of sanatoriums. He believes that all cost due to elaborate construction is unnecessary, and even defeats largely the

object sought. Some of the best work has been done in old sheds on a disused farm, and some of the poorest has come from sanatorial palaces. He believes that a sanatorium on a basis of fifty beds can be built at a cost of $500 per bed, while the cost of maintenance is easily kept at or below $6 per week; and this without using patients' labor as a source of economy. In fact, at the Loomis their system of graded work has been rather expensive than otherwise, in time, money, and in worry; still, they strongly believe that the therapeutic advantages are unquestionable.

Dr. Pottenger, in closing, expressed his disappointment with various articles lately written with the object of minimizing the value of sanatorium treatment. Such, he believed, were due to a wrong understanding. He said that a sanatorium, in the proper definition, aimed to give the best treatment possible under the best conditions possible; therefore, if results are at times disappointing, this should be credited rather to the particular sanatorium which showed such bad results, and not to the sanatorium principle. The results of sanatorium treatment are due in the main to the character of the man at its head and his work. If a physician is able to secure good results outside of an institution, he should obtain much better results in one. It would be very unfortunate if the public should get the impression that there is any quarrel between the sanatorium men and the home treatment men. All are aiming at the same object. He wished once more to emphasize the point that the core of his remarks lay in the word "individualization." No matter what the remedial measure or measures, be it open air, rest, exercise, food, hydrotherapy, or tuberculin, in or out of an institution, best results can only be obtained by careful individualization. Treatment can never be by rote, and he is particularly impressed with the danger of any routine method in treatment by tuberculin. This is one of our best remedies if used intelligently; but he fears that at the present time there is a sort of mad race in tuberculin treatment, and great danger of its indiscriminate use by practitioners who are ignorant of its action and lack intelligence in its employment. He foresees in this way serious danger of tuberculin falling once more into disrepute; and he urges that its use should be restricted to those who will make a most careful and thorough study of tuberculin and tuberculosis.

Dr. Norman Bridge (Los Angeles) felt that Dr. Latham's discussion of the value of sanatorium treatment was the best he had heard on that subject. Dr. Paterson's most important work in emphasizing the value of graduated labor is a distinct gain in the treatment of tuberculosis, although he cannot agree with his generalizations as to pathology. What we most need now in America, after places for advanced cases, are establishments for patients who can work a little, and who can be supported at small expense. In regard to the question of "languor," he agreed that it can be

produced as a result of autoinoculation, and also by a loaded large intestine, or by indigestion. In regard to the criticism of his own paper on resting the tuberculous lung, he is sorry to have Dr. Paterson call it an old-school method; for in America the old method is exercises, and it is against this harmful and often wicked doctrine he wishes to raise his voice. Bone injuries are still kept quiet, and no surgeon would move the fractured joint when the dressings are off. Of course, much of a tubercular lung is healthy, but it does not need to be exercised for its own sake. No harm would be done if it were not exercised during the repair of the diseased part. If a thigh is fractured, the muscles are quiescent for a long time, and they recover quickly their function. And insomuch as we are provided with twice as much lung capacity as is necessary, the diseased area can well be kept at rest. The American popular notion of lung gymnastics is founded on ignorance, and has done incalculable harm.

Dr. Paterson, in closing, remarked that he is in entire agreement with Dr. Pottenger as to the necessity of individualization. This is certainly more important than anything else. He agrees that after excessive exercise a feeling of languor is usually the first symptom, but fever appears a little later. He points out that he is not trying to rest the lung, but to get the patient well. He believes in using the lung in order to influence the state of the blood; in fact, to induce autoinoculation. The benefits of exercise are proved with very great frequency, not only by the subjective sensations of the patient, but by the objective observation that cough and sputum rapidly cease. As to the analogy with tuberculous joints, in which rest is indicated, he thinks that the lung cannot be put in a splint; the modern surgical treatment of joint and bone injuries is by early exercise and massage.

With regard to Dr. Philip's remarks concerning the value of work colonies, he agrees, and yet disagrees, with that speaker. In principle one should only accept in sanatoriums those who, after a sojourn of four to six months, can probably return to their homes fit for their former work; in other words, the very early cases. Yet it is notorious that one often has to accept more or less advanced cases; nevertheless, even such cases may, with care, hope to do quite heavy work with impunity; and if only they can be kept for, say, two years, there would be a reasonable prospect of their going back fit for work. For this class a labor colony would be a good thing; but its place is small.

Answering the remarks of Dr. Minor, he wishes to emphasize the point that a temperature of 99° is to be regarded, not as an indication to treat the patient like a typhoid case, but that the case should be watched with regard to the amount of work that should be allowed.

SECTION II.

Clinical Study and Therapy of Tuberculosis. Sanatoriums, Hospitals, and Dispensaries (*Continued*).

FOURTH DAY. AFTERNOON SESSION.

Thursday, October 1, 1908.

Continuing the Symposium on

SANATORIUMS, HOSPITALS, DISPENSARIES, AND HOME TREATMENT FOR THE TUBERCULOUS.

Section II of the International Congress on Tuberculosis was called to order by the President, Dr. Vincent Y. Bowditch, at half-past two o'clock.

THE ESTABLISHMENT OF DISPENSARIES IN CITIES AND TOWNS.

By Dr. R. W. Philip,
Edinburgh.

In place of submitting a more formal paper on this subject, regarding which I have elsewhere spoken and written much, I propose to commence the symposium by a short talk regarding the conception and purposes of the tuberculosis dispensary and its significance to the community.

We start from the following premises: (1) That tuberculosis is an infective condition. (2) That it ramifies through the social organization as does no other disease. (3) That it is of much greater frequency than is commonly supposed.

A word or two regarding each of these points:

1. As an infective condition, tuberculosis requires to be handled on the same lines as other infective diseases. The same principles which have been applied successfully to the prevention and treatment of cholera and the plague are applicable, with certain modifications. to tuberculosis.

Tuberculosis differs from most infective diseases in relation to both duration and clinical manifestation. There are cases which last six weeks, and there are cases which last twenty years or more. While it is desirable to segregate a considerable number of cases in the interest of uninfected individuals, it would be manifestly out of the question to try to segregate all.

2. Tuberculosis is largely dependent on faulty social conditions. From the moment the individual joins the social circle, he is exposed to a procession of causes which make for tuberculosis. The infant in the nursery is thus frequently exposed, whether the nursery be that of a one-room house or a well-to-do home. Similarly, school children are exposed from day to day to the prejudicial influence, either because of faulty conditions of the school premises or the presence of infected individuals. In a careful inspection of school children under the School Board of the city of Edinburgh, conducted by myself and an assistant, it was found that no fewer than 30 per cent. of the children examined presented stigmata of tuberculosis. I need not dwell on the harmful influence which meets the individual during working years, whether in office, workshop, or factory. These are sufficiently well recognized. The point is that, socially, we are linked to tuberculosis in a most intricate and complex fashion.

3. The amount of tuberculosis in a community is hardly sufficiently recognized. Attention has been too much confined to mortality statistics. These, indeed, sufficiently illustrate the large amount of tuberculosis which is present, but they give a totally inadequate conception of the whole. As a result of elaborate calculations on this point, I am constrained to conclude that one may safely multiply the total mortality from tuberculosis in any district by ten, in order to approximately state the number of cases which are worthy of the careful surveillance of the authorities. I believe that the number I have suggested might even be doubled. Thus, in a city of 500,000, with a death-rate from tuberculosis of 20 per 10,000, the number of tuberculous patients worthy of attention would amount to 10,000, or, if the larger multiple be taken, 20,000.

It is manifestly impossible that all such patients should be treated in hospital, whether in a sanatorium or in institutions for advanced cases. Fortunately, this is unnecessary. A large proportion of the patients require only treatment and preventive education at home. It is for this large intermediate group that the tuberculosis dispensary is of special service.

My conception of a tuberculosis dispensary is that of a central depot or bureau, toward which all tuberculous patients and all inquiries regarding tuberculosis should be directed. The dispensary should constitute the center of operations within the district. It is, at one and the same time, an information bureau, a reception house, a clearing house, through which patients are distributed to other institutions (sanatoriums, hospitals for

advanced cases, etc.), and especially a center for direction and surveillance in relation to the great group of patients who can be treated suitably at home.

In this connection, let me say that the dispensary is not to be considered only, or indeed chiefly, an institution for the treatment of individual patients. The individual patient will be treated in his own interest, and particularly in order that he may be retained under the direction of the dispensary. But the dispensary has a larger outlook that this. By means of a system of domiciliary visitation the patient's home conditions are carefully studied, both in respect of the dwelling itself and the health of the other members of the family. A careful investigation into these points is conducted by a qualified doctor and nurse, who visit the home of each patient.

In this way remarkable evidence is obtained regarding the conditions of residents, etc. Thus I find that from one house of four stories we have had as many as thirty-two patients from fifteen different families. In a street of fifteen houses there have been as many as fifty-four cases, and, while these are pretty uniformly distributed in fourteen houses, one house has yielded as many as fifteen cases. Similarly, in 65 per cent. of the cases the affected patient slept in the same bed as one or several members of the household; and in 11 per cent. more, occupied the same room. Further, we have found—doubtless as the result of financial depression—that such patients tend very frequently to flit from house to house. In 41 per cent. of our cases such flitting had occurred at least once or twice during two preceding years. The multiplication of areas of infection is thus great.

The other members of the patient's household are examined carefully, either at the dispensary or at the patient's own house, and thus cases are detected frequently at the early and correspondingly hopeful stage. It is extraordinary how many patients may be brought under the cognizance and direction of the dispensary by the visit of one case. We have registered and taken care of as many as fifteen cases in this way through the initial visit of one individual.

The great significance of the dispensary as an instrument of preventive medicine has been sufficiently illustrated. Let me add that in order to be entirely effective, the tuberculosis dispensary must not stand alone—it must be the center of a carefully organized and coördinated scheme. This scheme includes, on the one hand, a sanatorium for early cases, with its extension in the working colony, and, on the other hand, the hospital for advanced cases, according to the diagram which I show you.* Each factor is of significance itself, but its significance is enormously enhanced by combination and coördination of activity. It is such a plan of organized opera-

* These illustrations are in the Special Volume, page 267, Dr. Philip's lecture.

tions which was commenced by me in Edinburgh in 1887 by the foundation of the Tuberculosis Dispensary (Royal Victoria Dispensary for Consumption), and which has gradually been evolved as the need presented itself. From the very satisfactory results which we have obtained I have much confidence in recommending such a system for general adoption. It is with not a little satisfaction I find myself able to announce that the Local Government Board of Scotland has adopted the scheme as a national scheme for the prevention and treatment of tuberculosis.

In conclusion, as illustrating in some degree the significance of the plan, I would turn your attention to two charts* which indicate the mortality curve from pulmonary tuberculosis in London and Edinburgh respectively. While in both cities a striking fall in the death-rate has occurred during the past twenty years, in the latter ten years there appears a remarkable difference in favor of Edinburgh. The London death-rate for the ten years (1897 to 1906) shows a percentage fall of 17, while the Edinburgh death-rate shows a diminution in the same period of 42 per cent. Without attributing this fall entirely to the influence of the scheme of operations, it seems only fair to conclude that the scheme of operations has played an important part.

Resumen de Temas Sobre Dispensarios.—(PHILIP.)

El concepto de el dispensario.

Una institución central relacionada de todas las maneras posibles con la vigilancia, guía y alivio de los tuberculosos pobres. Una oficina de informacion. Un banco de liquidación. Un centro de inspeción y alivio á domicilio. El eslabón que conecta otras operaciones anti-tuberculosas.

El dispensario no debe abandonarse.

Relación al servicio de Salud Pública y á las autoridades locales. Importancia de la notificación. Investigaciones en los domicilios. Relacion á los sanatorios. Relación á los hospitales para casos avanzados, y á otras instituciones. Importancia de la actividad coordinada.

El Dispensario no es una institución costosa.

Symposium sur les Dispensaires, etc.—(PHILIP.)

L'idée des dispensaires: Une institution centrale qui s'occupe de guider, de surveiller et d'améliorer les tuberculeux pauvres, par tous les moyens possibles. Un bureau d'information. Une maison de défense. Un centre pour surveiller le traitement à la maison. L'anneau ou le noeud qui complète la chaîne d'autres travaux anti-tuberculeux.

* These illustrations are in the Special Volume, page 267, Dr. Philip's lecture.

Le dispensaire ne doit pas être isolé.

Relation du dispensaire au service sanitaire public et aux autorités locales. Questions concernant la déclaration des cas de tuberculose aux autorités sanitaires. Investigation à domicile. Relation du dispensaire aux sanatoria. Relation aux hôpitaux (pour les cas avancés) et à d'autres institutions.

Importance d'une activité coördonnée.

Le dispensaire n'est pas une institution coûteuse.

Symposium über Ambulatorien.—(PHILIP.)

Der Begriff von Dispensary (Ambulatorium, Poliklinik): Ein Centralinstitut, das sich mit der Unterweisung, Aufsicht und Unterstützung der tuberkulösen Armen abgiebt. Ein Auskunfts-Bureau. Ein "clearing-house." Ein Centrum von überwachter Heim-Unterstützung. Das Bindeglied oder der Knoten anderer Anti-Tuberkulosebewegungen.

Die Dispensary muss nicht allein und für sich stehen. Beziehung zum öffentlichen Gesundheitsamt und zu den lokalen Behörden. Beziehung auf die Anmeldung. Haus-Untersuchungen. Beziehung zu Sanatorien. Beziehung zu Spitälern für die vorgeschrittenen Fälle und zu anderen Anstalten. Bedeutung von koordinierter Mitarbeit. Dispensary keine kostspielige Anstalt.

RÔLE DU PRÉVENTORIUM OU DISPENSAIRE DANS LA LUTTE SOCIALE ANTITUBERCULEUSE.

PAR LE PROF. A. CALMETTE,
Directeur de l'Institut Pasteur de Lille.

Sur ma proposition, appuyée par les Professeurs Brouardel, Landouzy et Letulle, le Congrès international de la Tuberculose réuni à Londres en 1901 avait appelé l'attention des pouvoirs publics (Etats, Départements, Communes, Collectivités), sur la nécessité urgente de créer, tout d'abord dans les villes, des dispensaires antituberculeux spécialement destinés à la prophylaxie de la Tuberculose par l'éducation hygiénique du peuple et par l'assistance à domicile des nombreux malades qui ne peuvent être admis dans les sanatoriums de cure.

Le dispensaire Emile Roux, que j'avais créé à Lille l'année précédente, paraissait alors réaliser une sorte de type des établissements de ce genre. On s'empressa bientôt d'en organiser de semblables dans beaucoup de pays et il en existe déjà un grand nombre en France, en Belgique, en Angleterre, en Allemagne, en Autriche, en Italie, en Espagne, en Portugal, en Russie. Tous poursuivent, par des moyens quelquefois un peu différents, le même but, qui est d'empêcher la propagation de la tuberculose dans les milieux populaires. Ce sont essentiellement des instruments de préservation, d'où le nom de Préventorium par lequel je crois préférable de les désigner.

La fonction du Préventorium est complexe. Elle ne consiste point à soigner médicalement les malades pauvres, ce qui est le propre des sanatorias, des hôpitaux ou des services de consultations des bureaux de bienfaisance. Sa mission est toute de prophylaxie sociale. Il lui appartient de rechercher, d'attirer et de retenir, sous sa surveillance, par une propagande active, ceux qui, parmi les gens du peuple privés de ressources, sont plus particulièrement exposés à la contagion tuberculeuse et ceux qui sont déjà atteints. Son rôle est de donner aux uns et aux autres, aussi souvent et aussi longtemps qu'ils en ont besoin, des conseils pour eux et pour leurs familles; d'assainir leurs logements par des nettoyages fréquents et par des désinfections répétées à intervalles réguliers; de distribuer des crachoirs de poche, des antiseptiques; de procurer, dans les cas où cela est nécessaire, un logement plus salubre; de lessiver gratuitement le linge pour éviter la contagion dans la famille et hors de la famille; de sélectionner les malades curables qui peuvent utilement

être envoyés dans un sanatorium; de prendre en charge les convalescents récemment sortis des établissements de cure; de diriger vers les hôpitaux d'isolement ceux qui sont dangereux pour leur entourage ou qui ont besoin de soins spéciaux; de faire toutes les démarches utiles auprès de la bienfaisance privée, des patrons, des caisses d'assurances, etc. . . pour obtenir des secours qui permettent de rétablir le malade s'il n'est pas trop gravement atteint, et de le rendre à son travail; de recueillir enfin l'enfant du tuberculeux pour le placer à la campagne ou dans un sanatorium marin, en vue de le guérir s'il est déjà touché par le bacille, ou de le mettre à l'abri de toute occasion d'infection s'il est encore indemne.

On comprend facilement qu'une telle oeuvre présente une extrême souplesse d'organisation et de fonctionnement. On peut l'adapter aux besoins particuliers de chaque ville, de chaque quartier, de chaque collectivité. Elle se prête à des extensions ou à des modifications incessantes suivant les ressources dont elle dispose.

Un Préventorium ne nécessite en fait aucune installation coûteuse: un local très simple peut lui suffire. Il ne comporte que le matériel strictement indispensable aux investigations cliniques, à la désinfection des logements et au blanchissage du linge. Le personnel technique chargé d'assurer son fonctionnement peut être réduit à un ou deux médecins et à un ou deux enquêteurs "moniteurs d'hygiène." Son budget présente donc une élasticité que ne possèdent point les institutions d'assistance trop souvent obérées par leurs frais généraux.

Le médecin de Préventorium doit être à la fois bon clinicien et bon hygiéniste. Il faut que l'usage des procédés de diagnostic précoce de la tuberculose et des moyens les plus parfaits d'exploration clinique lui soient familiers. Mais il faut aussi qu'il se donne la peine d'éduquer ses malades, de les revoir souvent, de rester en contact pour ainsi dire permanent avec eux et avec leurs familles. C'est à lui qu'il appartient de déterminer la forme et le mode d'assistance qui conviennent le mieux dans chaque cas particulier. Et s'il a le devoir de s'abstenir, en règle générale, des interventions thérapeutiques, s'il doit éviter de gratifier ses malades de séances d'électricité ou d'ozonisation, d'injections médicamenteuses diverses, de potions ou de spécialités pharmaceutiques susceptibles de transformer le Préventorium en une polyclinique à réclame tapageuse, il a le droit de conseiller au tuberculeux qu'il sait pouvoir soulager ou guérir, d'entrer dans un sanatorium ou dans un hôpital, ou encore de suivre tel traitement approprié, que son médecin ou que le médecin de la collectivité à laquelle il appartient lui prescrira.

Avec une claire vision du rôle social qu'il a à remplir, le médecin de Préventorium comprendra que sa fonction essentielle est d'organiser la prophylaxie antituberculeuse dans la famille. Par une surveillance incessante,

il guettera chez les enfants du tuberculeux les premières manifestations du mal, il dirigera les soins maternels, il fera nettoyer, assainir ou évacuer les logements malsains; il signalera aux œuvres ou aux administrations d'assistance les infortunes à secourir; il apportera enfin à l'accomplissement de sa mission éducatrice toute l'obstination et toute l'énergie dont il est capable.

Il ne faut pas se dissimuler cependant que ses instructions risqueraient d'être mal comprises et ses conseils peu suivis si son intervention n'était pas complétée, prolongée par celle de l'enquêteur.

Ce dernier constitue, à proprement parler, la cheville ouvrière du Préventorium. Il est le véritable "Moniteur d'hygiène," instructeur du peuple. C'est lui qui visite périodiquement à domicile le malade, en camarade compatissant et dévoué; il cause amicalement avec les parents ou avec les enfants, s'inquiète de leurs besoins, de leur manière de vivre, de leurs habitudes, de leurs ressources, des oeuvres ou des caisses d'assurances susceptibles de les aider. C'est lui qui explique l'usage des antiseptiques et des crachoirs de poche. C'est lui qui démontre les inconvénients du balayage à sec, les dangers de contagion par les crachats et par le lait de provenance suspecte, les périls de l'alcool, les bienfaits de la sobriété et de la propreté. Il persuade au malade que, s'il veut éviter de se contagionner de nouveau au fur et à mesure qu'il marche vers la guérison, il ne doit pas disséminer partout ses produits d'expectoration, et cet argument "*ad hominem*" entraîne mieux la conviction que les plus beaux discours.

Le "Moniteur d'hygiène" du Préventorium, pour être compris, accueilli et écouté partout sans défiance, doit donc être un homme du peuple, intelligent, actif, dévoué, capable d'initiative et d'autorité, convaincu de l'importance du rôle social qu'il est appelé à remplir.

L'expérience déjà ancienne du Préventorium Emile Roux, de Lille, montre l'efficacité vraiment parfaite de l'éducation populaire ainsi comprise. La plupart des ouvriers retiennent bien et suivent les conseils qui leur sont donnés et répétés par un camarade appartenant à leur classe sociale, connaissant leurs misères et leurs besoins. Il n'en serait assurément pas ainsi, si ces conseils leur étaient donnés seulement à la consultation par le médecin, ou s'ils étaient apportés par quelque fonctionnaire d'ordre administratif, ou par les membres des Sociétés de bienfaisance ou de charité.

Cette organisation technique du Préventorium a beaucoup plus d'importance que la question du local choisi pour assurer le fonctionnement de l'oeuvre. A Lille, l'installation est des plus modestes. Elle a coûté, bâtiments et matériel, moins de 40.000 frs., non compris les frais d'acquisition du terrain, celui-ci ayant été concédé gratuitement par la Municipalité.

Elle comporte une salle d'attente, deux laboratoires pour l'examen clinique des malades, une chambre noire pour la laryngoscopie, un bureau pour le moniteur d'hygiène, une buanderie mécanique pourvue d'une les-

siveuse-désinfecteuse et de tous les appareils nécessaires au blanchissage rapide du linge.

Chaque famille de malade atteint de tuberculose ouverte est pourvue d'un sac en toile, portant un numéro d'ordre destiné à recevoir le linge usagé. Une fois par semaine, ce sac est apporté au Préventorium et, 48 heures après, le linge est rendu lessivé et sec à la famille.

Les logements sont nettoyés et désinfectés périodiquement par nos soins au moyen de lavages au lysol et au chlorure de chaux.

Notre oeuvre possédant actuellement des ressources suffisantes, nous avons jugé utile d'étendre son action, d'attirer et de retenir les malades pauvres en payant leur loyer ou en leur distribuant gratuitement quelques secours alimentaires sous forme de lait, de viande ou d'oeufs, indépendamment des secours de charbon, de pain ou de vêtements que leur fournissent les bureaux de bienfaisance. Mais la fonction essentiellement éducatrice du Préventorium est indépendante de cette oeuvre d'assistance qui peut être accomplie tout aussi bien, plus efficacement même par d'autres institutions charitables; la plupart des Préventoriums récemment créés rendent d'excellents services en abandonnant à celles-ci le soin de fournir aux miséreux l'aide matérielle dont ils ont besoin.

Les progrès récents de nos connaissances sur l'étiologie et sur le diagnostic précoce de la Tuberculose assurent au Préventorium un rôle de toute première importance dans la lutte sociale antituberculeuse. Tandis que le Sanatorium s'adresse exclusivement aux malades déjà atteints, mais reconnus curables et à ceux-là seulement qui représentent une valeur sociale justifiant les charges financières que la société devra s'imposer pour leur restituer leur capacité de travail, le Préventorium étend le bénéfice de son action à la fois aux malades, à leur famille et au milieu dans lequel ils ont vécu. Il est en même temps un bureau de recrutement pour les colonies scolaires, pour les sanatorias, pour les hôpitaux, et une école pratique d'hygiène; il supprime la contagion dans la famille et hors de la famille: il épie les premières manifestations de l'infection bacillaire chez les jeunes enfants en les soumettant périodiquement tous les trois ou tous les six mois par exemple, à l'épreuve de l'ophtalmo-diagnostic ou à celle de la cuti-réaction à la tuberculine. Il prend en charge et place à la campagne ou dans des établissements de cure, pour les mettre à l'abri de toute occasion de réinfection, ceux qui se montrent déjà touchés par le bacille; il recherche, attire, instruit, surveille et assiste tous les tuberculeux non sanatoriables, qui sont légion!

Mais, si bien organisé et si parfaitement dirigé qu'il puisse être, il ne saurait suffire à préparer seul la disparition de la tuberculose. Il serait décevant de lui attribuer des vertus auxquelles il ne peut prétendre. Il est, et doit rester seulement un instrument de préservation sociale; il ne constitue point une panacée!

Die Rolle des Präventoriums oder der Fürsorgestelle im sozialen Kampf gegen die Tuberkulose.—(CALMETTE.)

Das Präventorium oder die antituberkulöse Fürsorgestelle ist an und für sich ein Instrument des Sozialschutzes gegen die Tuberkulose. Ihre Funktion besteht nicht in der ärztlichen Pflege der Kranken, welche eigentlich die Sanatorien, die Spitäler, oder die Ambulatorien der Wohltätigkeitsvereine angeht. Ihre Mission ist, durch die tätige Propaganda die der Tuberkelansteckung besonders Ausgesetzten und die schon angegriffenen Hülfebedürftigsten aufzusuchen, anzuziehen und unter ihrer Beobachtung zu behalten. Sie sondert die heilbaren Kranken aus, die man mit Erfolg in Sanatorien behandeln kann; versorgt bedrohte oder vom Bazillus schon angegriffene Kinder, entweder um sie zu pflegen oder sie auf's Land oder in Seekuranstalten zu schicken; sendet die ihrer Umgebung gefährlichen Kranken in Isolierungs-Spitäler; sterilisiert die Wohnungen; desinfiziert und reinigt angesteckte Wäsche und teilt Spucknäpfe und Sanitätsmittel aus.

Endlich verwirklicht sie die hygienische Erziehung der Familien durch die Mitwirkung der "Gesundheitsermahner," die unter den Fähigsten und Angesehensten gewählt werden.

Die Heilstätte ist nur für schon angegriffene aber für heilbar gehaltene Kranke; aber das Präventorium bietet seine Wohltaten nicht nur den Kranken, sondern auch ihren Familien und ihrer Umgebung an. Sie ist Rekrutirungsagentur für akademische Kolonieen, für Sanatorien und Spitäler, und auch eine praktische Gesundheitsschule.

The Part Played by the Preventorium or Supporting Dispensary in the Social Antituberculosis Fight.—(CALMETTE.)

The preventorium or antituberculous supporting dispensary is essentially an instrument of social preservation against tuberculosis. Its function does not consist in treating patients medically; that is the part of sanatoriums, hospitals, and medical dispensaries attached to benevolent organizations. Its mission is to seek out, attract, and keep under supervision, by means of an active propaganda, those among the very poor who are peculiarly exposed to tuberculous infection and those who are already affected. It selects curable patients who are suitable for sanatorium treatment; takes charge of children that are menaced or already attacked by the bacillus, to take care of them or to cure them by placing them in the country or in seaside establishments; sends patients who are dangerous to their surroundings to isolation hospitals; sterilizes dwellings; disinfects and cleanses contaminated linen; and distributes spit-cups and antiseptics.

In fact, it brings about the hygienic education of families through the

collaboration of "monitors of hygiene" chosen among the most capable and authoritative men of the people.

The sanatorium is exclusively for patients already attacked by disease, but considered curable, but the preventorium extends its benefits not only to patients, but also to their families and their environment. It is a recruiting agency for academic colonies, for sanatoriums, and for hospitals, and also a school of practical hygiene.

El papel del Preventorium ó los Dispensarios en la lucha social contra la tuberculosis.—(CALMETTE.)

La Preventorium ó los dispensarios antituberculosos, es un factor esencial en la prevención social contra la tuberculosis. La función de éste no conciste en el tratamiento médico de los pacientes, lo cual corresponde á los sanatorios, hospitales, y dispensarios médicos de las organizaciones benevolentas. La misión de éste es de buscar, atraer y ayudar, bajo su responsabilidad, por medio de una propaganda activa, á aquellos entre los muy pobres que están particularmente expuestos a la infeccion de la tuberculosis, lo mismo que á aquellos que están ya afectados de la enfermedad. Este sanatorio hace una selección de los casos curables y que son favorables al tratamiento de los sanatorios; se hacen cargo de los niños que estan amenazados, ó que ya padecen de la infección, y los pone en el campo ó en establecimientos á la orilla del mar; envia os pacientes, que son una amenaza para la comunidad, a los hospitales de aislamiento; esteriliza los hogares; desinfecta y limpia los vestidos contaminados y distribuye escupideras y antisépticos.

En una palabra este esta encargado de la educacion higiencia de las familias por medio de la coloboracion de los "consejeros de la higiene" escojidos entre los hombres mas capaces y de mayor iniciativa en el pueblo.

El sanatorio es exclusivamente para los pacientes afectados de tuberculosis, pero que se concideran curables; mas el beneficio de la prevención se extiende no solamente a los pacientes, sino tambien a las familias y a la comunidad en general. Este es tambien un bureau de recluta para las colonias academicas, para los sanatorios, los hospitales y una escuela practica de higiene.

DIE AUFGABEN DER FÜRSORGESTELLEN, UNTER BESONDERER BERÜCKSICHTIGUNG DER FAMILIEN-UNTERSUCHUNG TUBERKULÖSER.

Von Prof. Dr. A. Kayserling,
Berlin.

Zu den grossen sozialen Kulturaufgaben der Gegenwart gehört die Ueberwindung der Tuberkulose. Nicht um die Bekämpfung einer Folgeerscheinung fortschreitender Kulturentwicklung handelt es sich dabei, sondern um die Ausrottung einer der ältesten Krankheiten der Menschengeschlechter, die allen Mitteln zum Trotz seit dem Tage des Hippokrates die Eigenart ihres Charakters bewahrt hat und für welche auch die Empfänglichkeit der Kulturmenschen heute noch die gleiche ist wie im Altertum. Wenigstens lässt sich dies aus den Schilderungen des Krankheitsbildes der Schwindsucht in den Werken des Hippokrates schliessen, welche vollkommen mit unserer heutigen Beobachtung übereinstimmen.

Im Laufe der Jahrtausende hat es nicht an Versuchen, der Seuche Herr zu werden, gefehlt. Namentlich im Zeitalter der Renaissance haben hervorragende Epidemiologen wie Giralamo Fracastor einer systematischen Bekämpfung der Tuberkulose vorgearbeitet. Jedoch blieb aus zweifachen Gründen der Tuberkulose-Bekämpfung jener Zeit ein entscheidender Erfolg versagt. Einmal mangelte es der Wissenschaft an der Einsicht der letzten Ursachen der Krankheit und sodann fehlte es an den sozialen Mitteln zur Fürsorge für den Kranken. Den grossen Wendepunkt brachte das Jahr 1882 durch die Entdeckung des Tuberkelbazillus. *Diese Entdeckung hat das grosse Problem der Ausrottung der Tuberkulose in ihrem letzten Grunde gelöst.* Ein Blick auf die Statistik Preussens wird besser und eindringlicher, als Worte es vermögen, die Wirkung dieser Entdeckung erleuchten. Wenige Jahre nach der Entdeckung des Tuberkelbazillus beginnt ein Rückgang der Sterblichkeit der Tuberkulose, der bis auf den heutigen Tag angehalten hat und diese Sterblichkeit um nahezu die Hälfte vermindert hat. Im Jahre 1882 starben von je 10,000 Lebenden in Preussen rund 31 an Tuberkulose, im Jahre 1906 dagegen nur 17. Diese Statistik weist uns den Weg, auf welchem wir der Tuberkulose Herr werden können, nämlich die Bekämpfung auf Grundlage der Erkenntnis, dass die Tuberkulose eine spezifische durch den Tuberkelbazillus bedingte Infektionskrankheit ist. Unser grosser

Führer und Meister auf dem Gebiete der Seuchenbekämpfung, Robert Koch, hat bereits an der Bekämpfung der Cholera und der Malaria nachgewiesen, dass es möglich ist, Infektionskrankheiten auf Grund der Kenntnis der specifischen Krankheitserreger wirksam zu bekämpfen. Das Verfahren ist in seinen Grundzügen von einer generellen Einfachheit. Mit Hülfe der bakteriologischen diagnostischen Methode wird jeder einzelne Fall von Cholera so früh als möglich festgestellt und sodann jeder als solcher erkannte Cholerafall in hygienischem Sinne unschädlich gemacht, er wird isoliert. Seine Abgänge werden dann desinfiziert, sodass von dem Kranken aus der Infektionsstoff nicht weiter verschleppt werden kann. Aehnlich liegen die Verhältnisse bei der Malaria-Bekämpfung. Mit Hülfe mikroskopischer Blutpräparate lässt sich der Infektionsstoff mit ausserordentlicher Sicherheit und leicht ermitteln. Finden sich in den Blutpräparaten eines Menschen Malaria-Parasiten, so wird der Ansteckungsstoff mit Hülfe des Chinins als eines ausgezeichneten Blut-Desinfektionsmittels im Menschen unschädlich gemacht. Werden an einem Orte alle Parasitenträger befreit, dann ist derselbe malariafrei. Wenn die Cholera heute in den Kulturländern ihren Schrecken für die Menschheit verloren hat, die über eine Organisation nach der Koch'schen Seuchenbekämpfung verfügen, so ist es ausschliesslich das Verdienst dieser Koch'schen Methode der Seuchenbekämpfung und man darf wohl sagen, dass es nur wenige wissenschaftliche Errungenschaften gibt, die zur Erhöhung des menschlichen Glückes so beigetragen haben, wie die Befreiung der Menschheit vom panischen Schrecken der Seuchen und Epidemien. Diese Erfahrungen sollen uns ein Fingerzeig sein, auch bei der Bekämpfung der Tuberkulose strikt nach den Grundsätzen der Seuchenbekämpfung zu verfahren. *Die Ueberwindung der Seuche ist heute weniger eine Frage der Wissenschaft als eine Frage der Organisation*, und wir bedürfen in erster Linie eines systematischen Vorgehens gemäss den Grundsätzen der Seuchenbekämpfung. Die Lehren, welche sich aus dem eben geschilderten Verfahren bei der Malaria und der Cholera ergeben, habe ich versucht, in den nachfolgenden Grundsätzen der spezifischen Seuchenbekämpfung zusammenzufassen:

1. Die Grundlage der von Koch inaugurierten Seuchenbekämpfung bildet die Kenntnis der biologischen Eigenschaften der spezifischen Krankheitserreger, das Ziel der Seuchenbekämpfung ist der Schutz der Gesunden vor Infektion durch Vernichtung des spezifischen Infektionsstoffes;

2. Die Koch'sche Seuchenbekämpfung kann bei denjenigen Infektionskrankheiten in Anwendung kommen, die wir erstens früh und sicher diagnostizieren können, und bei denen wir zweitens die Infektionsträger im hygienischen Sinne unschädlich machen können;

3. Der Angriffspunkt bei der Koch'schen Seuchenbekämpfung ist das infizierte Individuum;

4. Die Methodik der Koch'schen Seuchenbekämpfung besteht in dem systematischen Aufsuchen der Infizierten mit Hülfe bakteriologisch-diagnostischer Untersuchung und in der Unschädlichmachung des vom infizierten Individuum im Körper gebildeten oder aus dem Körper ausgeschiedenen Infektionsstoffes.

Bei der Durchführung dieser Prinzipien ist natürlich der Eigenart jeder Infektionskrankheit Rechnung zu tragen. Für die Tuberkulose möchte ich die Prinzipien der Seuchenbekämpfung in der nachfolgenden kurzen Formel zusammenfassen: *Die Nichtinfektiösen sind davor zu bewahren, infektiös zu werden und die Infektiösen sind im hygienischen Sinne unschädlich zu machen.* Die Erfüllung dieser Forderung erheischt in erster Linie die Schaffung von Zentren, von welchen aus die Tuberkulose einheitlich bekämpft werden kann. Solche Zentren hat man bei der Cholera, die sich vorzugsweise auf dem Wasserwege verbreitet, an den Flussläufen geschaffen, die Beobachtungsstationen, welch letztere sich in den letzten Jahren in Preussen dank ihrer vorzüglichen Organisation durch den Geheimrat Kirchner in hervorragender Weise bewährt haben.

Bei der Tuberkulose-Bekämpfung sollen die Aufgabe als Zentren die Fürsorgestellen erfüllen, welche innerhalb kurzer Zeit in Deutschland eine ausserordentlich weite Verbreitung gefunden haben. Bei der ärztlichen Organisation der Berliner Auskunfts- und Fürsorgestellen, die mir als ärztlichem Generalsekretär oblag, war es mein Bestreben, die Grundsätze der Koch'schen Seuchenbekämpfung in die Praxis durchzuführen und mit besonderer Genugtuung darf heute bereits konstatiert werden, dass die meisten deutschen Auskunfts- und Fürsorgestellen, die bisher begründet worden sind und deren Zahl sich gegenwärtig auf 170 beläuft, nach dengleichen Grundsätzen arbeiten.

Diese Grundsätze unter besonderer Hervorhebung der Familienuntersuchung in den Hauptgrundzügen darzulegen, ist die Aufgabe dieses Vortrages. Die erste Vorbedingung für eine systematische Bekämpfung infektiöser Krankheiten bildet die *Ermittlung.* Dabei hat man sich früher bei der Tuberkulose ebenso wie bei Typhus, und Cholera auf ein mehr defensives Verhalten beschränkt. Man nahm die Fälle in Behandlung, wie sie dem Arzt unter die Augen kamen. Erst Robert Koch ist bei der Cholera und bei Typhus aus der Defensive in die Offensive übergegangen. Solange man sich defensiv verhielt, ist es ein häufiges Vorkommnis gewesen, dass in einer einzigen Familie innerhalb mehrerer Jahre 3, 4 oder 5 Familienmitglieder erkrankten. Wenn in solchen Fällen rechtzeitig *offensiv* vorgegangen worden wäre, so hätte die ganze Familie untersucht werden müssen, sobald der erste Fall erkannt wurde. Es wäre dann noch möglich gewesen, die bereits Infizierten, aber noch nicht eigentlich Kranken zur Erziehung zur hygieni-

schen Lebensweise vor dem Ausbruch der Krankheit zu schützen oder sogar die Infektionsquelle für die noch Gesunden zu verschliessen.

Die offensive Bekämpfung der Tuberkulose nach den Grundsätzen der Seuchenbekämpfung erfordert zunächst, dass überall, wo ein ansteckungsfähiger Tuberkulöser festgesetzt wird, die ganze Familie auf Tuberkulose untersucht wird. Es würde ein ausserordentlicher Gewinn dieses Kongresses für die gesamte Tuberkulose-Bekämpfung sein, wenn es zum allgemeinen Prinzip erhoben werden würde, dass die Familien-Untersuchung bei offener Tuberkulose die erste Vorbedingung einer systematischen Bekämpfung bildet. Es ist dasselbe Verfahren, welches neuerdings auch bei anderen ansteckenden Krankheiten, bei Cholera, Pest und Genickstarre mit Erfolg durchgeführt worden ist. Die systematische Familienuntersuchung, welche für mich die Grundlage der gesamten Fürsorgetätigkeit bildet, ist jetzt in fast allen Fürsorgestellen eingeführt. In 82 deutschen Fürsorgestellen wurden im Jahre 1907 47,000 Menschen auf Tuberkulose untersucht und bei ca. 50% der Untersuchten ist Tuberkulose-Infektion oder -Krankheit festgestellt worden. Die systematische Familienuntersuchung erfordert:

1. Die körperliche Untersuchung der einzelnen Familien-Mitglieder, namentlich durch Auskultation und Perkussion;

2. Die Untersuchung des Auswurfs auf Bazillen; und

3. In zweifelhaften Fällen die Anwendung der diagnostischen Tuberkulinprobe.

Während die ersten beiden Verfahren in allen Fürsorgestellen geübt werden, beginnt man auch allmählich die Tuberkulinprobe zur Feststellung der zweifelhaften Fälle in umfassender Weise einzuführen. Ich möchte bei dieser Gelegenheit auf eine dieses Gebiet betreffende Neuerung hinweisen, welche die unter dem Vorsitz von Dr. Freund stehende Landesversicherungs-Anstalt in Berlin soeben einzuführen im Begriff ist. Um das Ermittlungsverfahren auf die höchste Stufe der Vollkommenheit zu bringen, richtet sie eine eigene *Tuberkulin-Station* in Lichtenberg ein, in welcher die bezüglich der Diagnose zweifelhaften Fälle unter ärztlicher Aufsicht vorbeobachtet werden und diagnostischen Tuberkulin-Einspritzungen unterworfen werden.

Was die Ergebnisse der Familienuntersuchungen betrifft, will ich kurz bemerken, dass man in Berlin bei den Bewohnern der einzimmerigen Wohnungen fast durchweg die Familienangehörigen tuberkulös infiziert gefunden hat und zwar namentlich die Kinder. Zum Belege hierfür mögen einige charakteristische Familienuntersuchungen angeführt werden:

1.

Vater: F. R. Schneider, 39 Jahre alt, 5 Jahre krank, Einkommen vor der Krankheit 27 Mark wöchentlich, im letzten Jahre 10 Mark Arbeitsver-

dienst und 7.50 Mark Armenunterstützung wöchentlich. Lungenbefund:* R. III, L. II, Auswurf enthält zahlreiche Tuberkelbazillen.

Mutter: V. R., 37 Jahre alt, 3 Jahre krank, R. III, Auswurf enthält zahlreiche Tuberkelbazillen.

1. Kind: H. R., 12 Jahre alt, 1 Jahr krank, R. III, Auswurf enthält zahlreiche Tuberkelbazillen.

2. Kind: V. R., 5 Jahre alt, R. I, ohne Auswurf.

Zusammenfassung: Eine aus 4 Personen bestehende Familie, von denen 3 an vorgeschrittener Tuberkulose mit Tuberkelbazillen im Auswurf leiden, während das 4. Familienmitglied an geschlossener Tuberkulose leidet.

2.

Vater: Strassenarbeiter G. G., 41 Jahre alt, 4 Jahre krank, Einkommen vor der Krankheit 18–21 Mark wöchentlich, seit der Krankheit 9 Mark wöchentlich Krankengeld. Lungenbefund: R. II, L. I, Auswurf enthält Tuberkelbazillen.

Mutter: E. G., 46 Jahre alt, ½ Jahr krank, R. II.

1. Kind: W. G., 19 Jahre alt, R. III, Tuberkelbazillen im Auswurf.

2. Kind: E. G., 17 Jahre, gesund.

3. Kind: A. G., 6 Jahre, L. I, Knochentuberkulose.

Zusammenfassung: Eine aus 5 Personen bestehende Familie, von denen 2 an offener Tuberkulose, 2 an geschlossener Tuberkulose leiden.

3.

Vater: F., 37 Jahre alt, R. III, L. III, liegt im Sterben.

Mutter: A. F., 36 Jahre alt, L. I.

1. Kind: H. F., 16 Jahre alt, seit 2 Jahren krank, L. III, R. I, Auswurf enthält Tuberkelbazillen.

2. Kind: A. F., 7 Jahre alt, seit ½ Jahr krank, R. II, Auswurf enthält Tuberkelbazillen.

(3. Kind: M. F., 6 Wochen nach dem Tode des Vaters geboren.)

Zusammenfassung: Eine aus 4 Personen bestehende Familie, von denen 3 an offener Tuberkulose und 1 an geschlossener Tuberkulose leiden.

4.

Vater: T. E., Schriftsetzer, 41 Jahre, seit 3 Jahren krank, Einkommen vor der Krankheit 35 Mark wöchentlich, zur Zeit 17,50 Mark Invalidenrente und 40 Mark Krankenunterstützung monatlich, R. III, L. I, Auswurf enthält Tuberkelbazillen.

Mutter: L. E., 37 Jahre, seit ½ Jahr krank, R. I, L. I, ohne Auswurf.

1. Kind: H. E., Kontorbote, 16 Jahre alt, seit 1 Jahre krank, R. II, L. I, Auswurf enthält Tuberkelbazillen.

2. Kind: E. E., 14 Jahre alt, seit ¾ Jahr krank, R. II, Auswurf ohne Tuberkelbazillen.

3. Kind: T. E., 13 Jahre alt, R. I, tuberkulöse Halsdrüsen.

Zusammenfassung: Eine aus 5 Personen bestehende Familie, von denen 2 an offener, 3 an geschlossener Tuberkulose leiden.

* Der Lungenbefund ist nach der Stadieneinteilung Turban-Gerhard (Kaiserliches Gesundheitsamt) bezeichnet.

Solche Beobachtungen, die unter gleichen Wohnungsverhältnissen wohl immer wiederkehren, offenbaren mit voller Klarheit die Richtungslinien der Tuberkulose-Bekämpfung; sie ermöglichen, die bestehenden Seuchenherde zu assanieren und die Bildung neuer Seuchenherde zu verhindern. Dabei ist immer zu berücksichtigen, dass als das Zentrum eines Seuchenherdes der tuberkulöse Mensch zu betrachten ist, der mit seinem Auswurf Tuberkelbazillen in die Aussenwelt ausscheidet. Es wäre aber ein grundsätzlicher Fehler, wollte man die Bekämpfungsmassnahmen ausschliesslich auf diese Kategorie von Tuberkulösen beschränken und die Nichtinfektiösen, d. h. die mit geschlossener Tuberkulose Behafteten, ausser Acht lassen. Man würde dann nicht verhindern können, dass diese später zu einem neuen Infektionsherde werden und vor allem sich *einen* wichtigen Punkt entgehen lassen, an dem der Kreislauf der Tuberkulose-Infektion mit Erfolg durchbrochen werden kann.

Eine dergestalt ausgeführte Ermittlung setzt die Fürsorgestellen in die Lage, dem Grundsatze der Seuchenbekämpfung gemäss zu handeln und zwar erstens die Nichtinfektiösen davor zu bewahren, infektiös zu werden und die Infektiösen im hygienischen Sinne unschädlich zu machen. Die einzelnen in dieser Hinsicht in Betracht kommenden Massnahmen sollen nachfolgend kurz skizziert werden.

Was zunächst die Nicht-Infektiösen betrifft, so muss man zwei Gruppen unterscheiden.

1. Die Latent-Tuberkulösen, und zweitens die aktiven Tuberkulösen. Die spezifischen Bekämpfungs-Massnahmen, welche die Fürsorgestellen einzuleiten haben müssen bei Latent-Tuberkulösen darauf hinzielen, *den Infektionsstoff für die Allgemeinheit in der Weise unschädlich zu machen, dass ein späterer Uebergang in offene Tuberkulose verhütet wird.*

Als Mittel stehen zu diesem Zwecke zur Verfügung:

1. Die besondere Erziehung der Latent-Tuberkulösen zu hygienischer Lebensweise, und

2. Die spezifische Behandlung mit Tuberkulin.

Die Hauptsache ist dabei, dass diese Mittel bereits im Kindesalter in umfassender Weise und zielbewusst angewandt werden, denn im Kindesalter vermag die hygienische Erziehung die besten Erfolge zu verzeichnen, und vor allem ist es im Kindesalter möglich, die Latent-Tuberkulösen für solche Berufe vorzubereiten, welche mit keinen zur Tuberkulose disponierenden Schädlichkeiten verbunden sind.

Entfernung aus den licht-und luftarmen Wohnungen der Städte und Ansiedlungen auf dem Lande ist für die latent-tuberkulösen Kinder dringend geboten. Namentlich die *Landpflege* nach dem von Grancher gegebenen Vorbilde ist empfehlenswert. Die Kinder werden aufs Land zu geeigneten

Familien in Pflege gegeben, besuchen die Schule auf dem Lande und stehen dauernd unter Aufsicht des ortsansässigen Arztes.

Die mit der Landpflege zu verbindende Tuberkulinkur müsste selbstverständlich durch den aufsichtsführenden Arzt des Ortes mit kleinsten Dosen Alttuberkulin unter Vermeidung aller Reaktionen etappenweise durchgeführt werden.

Der Landpflege an die Seite zu stellen sind die ländlichen Kolonien, für den Fall, dass diese so organisiert sind, dass die Kinder jahrelang dort bleiben können.

Neben der Landpflege kommt als zweites sehr bedeutsames hygienisches Erziehungsmittel für latent-tuberkulöse Kinder die *Waldschule* in Betracht. Der Wert der Waldschule besteht darin, dass sich die Kinder den ganzen Tag in der frischen Luft aufhalten können und dass sie vollkommen aus dem Elternhause entfernt sind. Mit dem Waldschulaufenthalt ist ständige ärztliche Ueberwachung und spezifische Behandlung der Kinder zu verbinden.

Alle Massnahmen, welche eine *dauernde* Entfernung der Latent-Tuberkulösen vom Infektionsherde ermöglichen, sind vom Standpunkt der Seuchenbekämpfung denjenigen vorzuziehen, bei denen die Entfernung nur eine *vorübergehende* ist.

Es soll dabei keineswegs verkannt werden, dass in zahlreichen Einzelfällen die zeitweise Unterbringung in Kur- und Erholungsstätten zur Kräftigung der Konstitution von grossem Nutzen sein können; namentlich die Walderholungsstätten leisten in dieser Hinsicht sehr Erspriessliches.

Für die latente Tuberkulose der Erwachsenen gilt im Prinzip dasselbe wie für die Kinder: Erziehung zu hygienischer Lebensweise, Fernhaltung von Berufen, welche mit Staubbildung oder anderen die Entwicklung der Tuberkulose fördernden Schädlichkeiten verbunden sind; von Zeit zu Zeit wiederholte Tuberkulinkuren; dauernde ärztliche Beobachtung, namentlich in Perioden verminderter Widerstandsfähigkeit, wie z. B. nach erschöpfenden Krankheiten; sorgfältige Pflege. Hierdurch wird man in der Regel den Eintritt einer aktiven Tuberkulose verhüten können. Heilstättenbehandlung halte ich für die latente Tuberkulose generell nicht für notwendig; es würde eine Verschwendung von Geldmitteln bedeuten, wenn man Latent-Tuberkulöse dieser immerhin kostspieligen Behandlung unterwerfen würde.

Die spezifischen Bekämpfungsmassnahmen für die zweite Gruppe der nichtinfektiösen Tuberkulose, die aktiven Formen der chronischen Lungentuberkulose des Initialstadiums sind umfassender als bei den eben behandelten latenten Lungentuberkulösen. Zu den aktiven Formen der Lungentuberkulose sind im Gegensatz zur latenten diejenigen Fälle zu rechnen, bei welchen infolge der Giftwirkung der Tuberkelbazillen das Körpergleichgewicht gestört ist und die ersten Krankheitserscheinungen auftreten. Die

aktive Form kann entweder aus der latenten Form entstehen, oder die Reaktion des bis dahin gesunden Organismus auf eine frische Infektion darstellen.

Die Fortschritte in der Frühdiagnose des letzten Dezenniums ermöglichen es, besonders dank den Erfahrungen der Tuberkulindiagnostik dieses Initialstadium als ein scharf umgrenztes Krankheitsbild mit vollkommener Sicherheit zu erkennen.

Je frühzeitiger in jedem einzelnen Falle dieses Initialstadium erkannt wird, um so grösser sind die Aussichten auf eine Ausrottung der Tuberkulose, denn in mindestens 80% der Fälle ist es möglich, bei der geschlossenen Form der Tuberkulose das Fortschreiten zu verhindern und den Infektionsstoff im Organismus durch die hygienisch-diätetische Behandlung in Verbindung mit der spezifischen Tuberkulinbehandlung insoweit unschädlich zu machen, dass der Uebergang in offene Tuberkulose verhindert wird. Zu dieser Ueberzeugung bin ich durch die fortdauernde Beobachtung von Patienten gelangt, welche in den Jahren 1900–1902 in der Heilstätte Belzig nach einem von B. Fränkel (Berlin) angeregten und von A. Möller und mir ausgearbeiteten Verfahren behandelt wurden. Der frühere Misserfolg der Tuberkulinbehandlung ist meines Erachtens im wesentlichen darauf zurückzuführen, dass das Tuberkulin bei Patienten angewendet wurde, deren Kräftezustand unternormal war und die daher nicht hinreichend imstande waren, auf das Tuberkulin mit der Bildung von Schutzstoffen zu reagieren.

Es ist daher nötig, erst den Organismus durch das hygienisch-diätetische Verfahren zu kräftigen und alsdann das Tuberkulin anzuwenden.

Für die Behandlung des Initialstadiums der Tuberkulose sind eigene Stätten erforderlich, wo die hygienisch-diätetische Behandlung des kranken Menschen ein genaues Studium der Konstitution notwendig macht und je mehr die Behandlung der Konstitution des einzelnen angepasst wird (Berücksichtigung der Herzkraft, Blutbeschaffenheit, Stoffwechsel etc.), um so grösser werden die Erfolge.

Es war ein überaus glücklicher Gedanke, die Stätten in welchen die Sonderbehandlung der Tuberkulose durchgeführt wird, als Heilstätten zu bezeichnen und die bisher vorliegenden Statistiken über die Heilerfolge berechtigen zu den höchsten Erwartungen für die dauernde Heilung der Nichtinfektiösen, und meines Erachtens liegt gegenwärtig der Schwerpunkt der Heilstättenwirksamkeit vom Standpunkte der Seuchenbekämpfung auf der Beeinflussung der nichtinfektiösen Initialfälle.

Indem die Heilstätten die spezifischen Schutzstoffe des Organismus gegen die eingedrungenen Tuberkelbazillen zur Entfaltung bringen und die infizierten Individuen zur Führung derjenigen hygienischen Lebensweise anhalten, welche sie befähigt, dauernd der Giftwirkung der Tuberkelbazillen zu widerstehen, verlegen sie den Angriffspunkt der Bekämpfung in die

früheste Entwicklungsperiode der Krankheit; der endgültige Erfolg der Heilstättenarbeit kann bei dem chronischen Charakter der Tuberkulose erst nach Jahrzehnten in die Erscheinung treten und wird auch nicht ausbleiben—dafür sprechen die vorliegenden Statistiken—wenn gleichzeitig die vorhandenen Infektionsquellen geschlossen und dadurch der unaufhörliche Zufluss neuer Infizierter unterbunden wird.

Nach der Entlassung aus den Heilstätten muss auch der anscheinend Gesunde mindestens noch drei Jahre unter ärztlicher Aufsicht bleiben—und zwar zur Ermöglichung einer vergleichenden Kontrolle des Lungenbefundes unter der Aufsicht des gleichen Arztes—und dabei alle diejenigen Massnahmen beobachten, welche oben für die Latenttuberkulösen angegeben sind. Zu Wiederholungskuren, die von kürzerer Dauer sein können als die ursprünglichen Heilstättenkuren, können offene Luftkurorte und Walderholungsstätten mit Erfolg herangezogen werden, jedoch nicht zu den ersten Kuren.

Die richtige Auslese für die Heilstätten zu gestalten und die dauernde Nachbeobachtung der aus der Heilstätte Entlassenen zu übernehmen ist eine der wichtigsten Aufgaben der Fürsorgestellen. Das ist der Grund, warum ich an dieser Stelle etwas ausführlicher auf das Heilstättenwesen und ihre Bedeutung auf die Tuberkulosen-Bekämpfung eingehen musste.

Weit umfassender als bei den nichtinfektiösen Tuberkulösen sind die spezifischen Bekämpfungsmassnahmen bei der zweiten grossen Gruppe, den infektiösen Tuberkulösen.

Nach der oben aufgestellten Formel haben die Fürsorgestellen bei dieser Gruppe die Aufgabe zu erfüllen, *die Erkrankten in hygienischer Beziehung unschädlich zu machen.* Was unter infektiösen Tuberkulösen zu verstehen sind, ist eigentlich von vorneherein klar: es sind alle diejenigen an Lungentuberkulose Leidenden, die Tuberkelbazillen von erkrankten Partien in die Aussenwelt ausscheiden. Die Unschädlichmachung der Infektionsstoffe kann auf zweierlei Weise erfolgen, entweder *indem man durch therapeutische Massnahmen die Ausscheidung der Tuberkelbazillen zum Schwinden bringt,* oder indem man die *ausgeschiedenen Tuberkelbazillen für die Allgemeinheit unschädlich macht.*

Die Verhütung der weiteren Ausscheidung von Tuberkelbazillen ist eine Aufgabe, die wiederum im wesentlichen den Heilstätten zufällt. Was in dieser Hinsicht geleistet werden kann, zeigt eine nachfolgende Statistik, welche aus den von Regierungsrat Hamel ausgeführten Tuberkulose-Arbeiten des Kaiserlichen Gesundheitsamtes zusammengezogen ist, und die sich auf 12,000 Fälle erstreckt.

Es waren unter 12,879 in Heilstätten behandelten Patienten 5550 (43,1%) mit Tuberkelbazillen behaftet; von diesen verloren die Tuberkelbazillen insgesamt 31,6%. Dies Schwinden der Bazillen aus dem Auswurf

bedeutet zunächst die zeitweilige Ueberführung der Infektiösen in das nichtinfektiöse Stadium. Das weitere Schicksal solcher mit bestem Erfolge in Heilstätten Behandelten hängt im wesentlichen von der weiteren Lebensführung der Erkrankten ab. Hier harrt noch eine wichtige Aufgabe ihrer Lösung: nämlich die Vertiefung des Heilerfolges bei den Infektiösen. Einen neuen Weg in dieser Richtung ist die Landesversicherungsanstalt Berlin, die in Beelitz über die grösste Heilstätte der ganzen Welt verfügt, im Begriffe zu beschreiten. In der im Oktober dieses Jahres zu eröffnenden *Tuberkulinstation* sollen die in den Heilstätten mit Tuberkulin behandelten Patienten im Laufe des ersten Jahres nach der Entlassung oder später einer erneuten Tuberkulinbehandlung unterzogen werden; durch diese von Petruschky empfohlene Etappenbehandlung sollen die Dauererfolge bei den Infektiösen noch nachhaltiger gestaltet werden.

Stadium der Erkrankung bei der Aufnahme.	Anzahl der in Betracht kommenden Kranken.	Hiervon hatten					
		keinen Auswurf %		bazillenfreien Auswurf %		bazillenhaltigen Auswurf %	
I	3359	527	15,7	2015	60,0	817	24,3
II	7034	775	11,0	3399	48,3	2860	40,7
III	2486	80	3,2	533	21,4	1873	75,3
Summa	12879	1382	10,7	5947	46,2	5550	43,1

Das wichtigste Arbeitsgebiet fällt den Fürsorgestellen bei den Fällen offener Tuberkulose zu, in welchem entweder das Heilverfahren im Sinne der Seuchenbekämpfung erfolglos war, oder infolge vorgeschrittener Krankheit nicht eingeleitet werden konnte. In diesem Falle ist das ganze Schwergewicht des Fürsorgeverfahrens auf die hygienische Unschädlichmachung des Infektiös-Tuberkulösen durch Sanierung der tuberkulösen Familien in ihren Wohnungen selbst zu legen.

In dieser Beziehung gilt auch heute noch, was Koch bereits im Jahre 1883 in seiner "Aetiologie der Tuberkulose" geschrieben hat. "Die prophylaktischen Massregeln müssen teils darauf gerichtet sein, die Tuberkelbazillen durch passende Desinfektionsverfahren direkt zu vernichten, teils müssen sie dahin streben, die Gesunden von der Berührung mit Tuberkelbazillen in allen den Verhältnissen zu bewahren, in denen eine zuverlässige Vernichtung der Parasiten nicht zu ermöglichen ist. Aber bei der grossen Ausdehnung dieser Krankheit werden alle Schritte, welche gegen dieselbe getan werden, mit den sozialen Verhältnissen zu rechnen haben, und es wird deswegen sorgfältig zu erwägen sein, in welcher Weise und wie weit man auf

diesem Wege gehen darf, ohne dass der gestiftete Nutzen durch unvermeidliche Störungen und andere Nachteile wieder beeinträchtigt wird."

Die für die Unschädlichmachung der Tuberkelbazillen in Betracht kommenden Massnahmen sind theoretisch ausserordentlich einfach; sie lassen sich folgendermassen kurz zusammenfassen:

1. Unschädlichmachung des Auswurfs durch Auffangen in wassergefüllte Speinäpfe und Verhütung der Verstäubung.

2. Verhütung der Tröpfcheninfektion durch Halten der Hand vor den Mund bei Hustenstössen.

3. Enthalten von intimen Berührungen (Küssen).

4. Peinliche Sauberhaltung der mit Auswurf in Berührung kommenden Körperteile (Mund-, Hand- und Bartpflege).

5. Desinfektion der mit Auswurf in Berührung kommenden Gebrauchsgegenstände (Ess- und Trinkgeschirr, Servietten, Taschentücher, Leib-und Bettwäsche).

In der Praxis lassen sich diese Massnahmen vielfach auf die Dauer nicht ohne Aenderung der gesamten Lebensführung des Kranken durchführen; es wäre ein grober Irrtum, wollte man diese Massnahmen unterschiedslos bei allen infektiösen Tuberkulösen zur Anwendung bringen, auch sie müssen nach dem Grade der Krankheit abgestuft werden.

So lange die Krankheit nur auf kleine Bezirke der Lunge beschränkt bleibt, wird der Auswurf in verhältnismässig geringen Mengen ausgeschieden; er ist leicht unschädlich zu machen und die Gefahr der Tröpfcheninfektion kann unberücksichtigt bleiben. Von irgend einem eingreifenderen Verfahren muss in solchen Fällen umsomehr abgesehen werden als die Krankheit jahrelang im Stadium der offenen Tuberkulose verharren kann, ohne die Arbeitsfähigkeit in erheblicherem Masse zu beeinträchtigen. Jede, das Familien- und Berufsleben berührende Massnahme, wie z. B. die Beaufsichtigung auf dem Wege staatlicher Anzeigepflicht, könnte für solche Kranke unberechenbaren Schaden nach sich ziehen (Stellungsverlust u. a.); so lange wir daher nicht in der Lage sind, allen Eventualitäten durch ausreichende Versorgung zu begegnen,—und dazu ist die Tuberkuloseverbreitung heute noch zu enorm,—so lange müssen wir uns damit bescheiden, durch hygienische Belehrung zu wirken, die Widerstandsfähigkeit durch therapeutische Massnahmen immer von neuem zu erhöhen (Wiederholungskuren), die Kranken zur Erfüllung der Tuberkuloseprophylaxe in ihrem eigenen, wie im Interesse ihrer Familienangehörigen und Arbeitsgenossen zu ermahnen und im übrigen sie auf den Weg der Selbsthilfe zu verweisen.

Es ändert sich jedoch die Sachlage von dem Zeitpunkt an, in welchem mit dem Fortschreiten der Krankheit ein Schwinden der Körperkräfte einsetzt, denn dann ist der Kranke nicht mehr imstande, sich aus eigener Kraft zu helfen. Die Abnahme der Arbeitskraft bedingt eine Abnahme des

Arbeitsverdienstes, welche zu einer Einschränkung der gesamten Lebenshaltung führen muss und in erster Linie die Wohnungsverhältnisse trifft; das Erlöschen der Arbeitskraft vollzieht sich nur langsam; selbst bei vorgeschrittenen Zerstörungen im Lungengewebe kann ein Rest von Arbeitskraft erhalten bleiben, und die vollkommene Arbeitsunfähigkeit tritt erst mit dem Uebergang in das hektische Stadium ein, und man könnte fast sagen, wenn man von Komplikationen absieht, dass die Arbeitskraft proportional der Fieberhöhe sinkt.

Kranke in diesen Stadien der Tuberkulose bilden, so lange sie noch arbeitsfähig sind, zwei Infektionszentren, eines bei der *Arbeit* und eins im *Heim*. Diese Infektionszentren sind aus dem Grunde besonders gefährlich, weil erstens reichlich Auswurf produziert wird, und weil zweitens die Gefahr der Tröpfcheninfektion mit fortschreitender Krankheit erhöhte Bedeutung gewinnt; je grösser die Zerstörung im Lungengewebe, um so grösser wird naturgemäss auch die Gefahr der Tröpfcheninfektion, namentlich in engen Arbeits- und Wohnräumen.

Man könnte nun annehmen, dass der ausgiebige Gebrauch des Spucknapfes auch bei der Arbeitsstelle die Ansteckungsgefahr vermindert; tatsächlich gebraucht aber der vorgeschrittene Tuberkulöse bei der Arbeit seinen Spucknapf nicht. Der Spucknapf macht ihn seinen Arbeitsgenossen verdächtig, und er selbst hat das lebhafteste Interesse daran, nicht als schwindsüchtig zu gelten, weil er sonst bei der heutigen Kenntnis der Ansteckung der Tuberkulose Gefahr läuft, seine Stellung zu verlieren. Wenn ich bisweilen vorgeschrittene Tuberkulöse, die noch arbeiteten, nach ihrem Spucknapf fragte, so bekam ich in der Regel die Antwort: "Bei der Arbeit kann man keinen Spucknapf gebrauchen, sonst verliert man seine Arbeit," und wenn ich weiter fragte, wie sie denn mit ihrem Auswurf bei der Arbeit umgingen, so erhielt ich zur Antwort, sie spuckten auf den Boden wie die anderen, denn selbst der häufige Gebrauch der aufgestellten Spucknäpfe mache sie verdächtig.

Den Tuberkulösen eine zweckentsprechende Arbeit zu verschaffen ist eine der schwierigsten Aufgaben der Fürsorgestellen; auch für diese Kategorie von Tuberkulösen müssen wir gleichfalls danach streben, Stätten ins Leben zu rufen, in welchen solchen Individuen die denkbar günstigste Gelegenheit geboten wird, unter hygienischen Verhältnissen den ihnen erhaltenen Rest von Arbeitskraft auszunützen. Ich denke dabei *wiederum in erster Linie an die hygienischen Arbeitsheime.*

Was das zweite Infektionszentrum, das eigene Heim, anbetrifft, so kann dessen Bedeutung für die gesamte Tuberkulosebekämpfung nicht hoch genug veranschlagt werden. Die oben mitgeteilten Beispiele von Familien-Infektionen Seite 8–9 offenbaren mit voller Klarheit die wahren Seuchenherde der Tuberkulose und zeigen zugleich den Punkt an, auf welchem s. Zt. das

Schwergewicht der gesamten Tuberkulosenbekämpfung zu legen ist, nämlich die Sanierung der in beschränkten Wohnungsverhältnissen lebenden tuberkulösen Familien. Diese Aufgabe bildet naturgemäss den Hauptinhalt der Fürsorge-Tätigkeit. Dieses Sanierungswerk muss, wenn es die Krankheit an der Wurzel ergreifen soll, die gesamten Lebensbedingungen der tuberkulösen Familie treffen, and folgende Punkte umfassen:

1. Die Fürsorge für den vorgeschrittenen Tuberkulösen;
2. Die Erhaltung der Widerstandsfähigkeit der infizierten Familienmitglieder;
3. Den Schutz der Gesunden.

Die vom Standpunkte der Seuchenbekämpfung zweifellos beste Methode der Fürsorge für den vorgeschrittenen Tuberkulösen wäre seine dauernde Unterbringung in Isolieranstalten, d. h. seine dauernde Entfernung aus dem Schosse seiner Familie. Leider ist dieser Weg nur mit ausserordentlichen Schwierigkeiten verknüpft, wie die in jüngster Zeit mit dem Invalidenheim Gross-Hansdorf gemachten Erfahrungen lehren. Dieses von der Landesversicherungsanstalt der Hansestädte errichtete Invalidenheim trägt seiner Anlage nach vollkommen den Charakter der Isolieranstalt. Nach dem Jahresberichte vom Jahre 1906 sind von den seit dem Jahre 1903 aufgenommenen 112 tuberkulösen Personen 62 wieder zu ihren Familien zurückgekehrt, 31 gestorben und es gelingt nicht mehr, die Anstalt mit ihren nur 30 Betten zu füllen. Dieser Misserfolg erklärt sich vollkommen aus dem psychischen Zustande der Kranken; für sein Handeln gibt es nur ein Leitmotiv,—er will gebessert werden, der Schutz seiner Umgebung kommt erst in letzter Linie; eine Anstalt, die den Isoliercharakter in den Vordergrund setzt, vermag ihn nicht zu befriedigen, mag sie noch so schön und hygienisch eingerichtet sein; überdies wird er sich nie mit dem Gedanken vertraut machen, dauernd von seinen Angehörigen getrennt zu sein. Diesen Empfindungen des Kranken muss bei allen Massnahmen für Vorgeschrittene Rechnung getragen werden.

Indes stehen auch so hinreichend Mittel zur Verfügung, um wirksam eingreifen zu können; das erste Mittel wäre die Isolierung im Hause, innerhalb der Familie, indem man den Kranken ein hygienisches Krankenzimmer verschafft, und durch besondere Pflegerinnen für Durchführung der erforderlichen Krankenpflege und Desinfektion Sorge trägt. Diese Form der Isolierung erheischt erhöhte Aufwendungen; in Berlin z. B. kostet das Zumieten eines Zimmers 8–10 Mark pro Monat. Die Zahl der Kranken, denen nach obiger Statistik ein Zimmer zugemietet werden müsste, beläuft sich allein für die jährlich in ihren Wohnungen Sterbenden auf ca. 1000; es würden somit in Berlin die Aufwendungen für diesen Zweck, wenn man für das Endstadium der Krankheit sorgt, jährlich 80–100,000 M. betragen. Der Zuschuss für das Zimmer wird von dem Patienten selbst nicht bestritten,

der Rückgang des Verdienstes macht es ihm unmöglich, und er selbst denkt auch nicht daran, da er immer vorzieht, sich besser zu ernähren und schlechter zu wohnen, als umgekehrt. Die Fürsorgestellen sind berufen hier einzugreifen, müssen aber natürlich für solche Zwecke, wenn sie namentlich in den Grossstädten etwas Durchgreifendes leisten wollen, über grosse Geldmittel verfügen. Wenn auch die dauernde Unterbringung der vorgeschrittenen Tuberkulösen ausserhalb des Hauses sich als nicht durchführbar erweist, so ist doch neben der Heimfürsorge die vorübergehende Entsendung in ein Krankenhaus eines unserer wertvollsten Mittel, und es kann nur auf's lebhafteste bedauert werden, dass man bisher den Mahnungen von Koch und B. Fränkel nach Errichtung von Spezial-Krankenhäusern nicht gefolgt ist.

[Bei der Einrichtung der Krankenhäuser müsste dem Umstande Rechnung getragen werden, dass die vorgeschrittenen Lungenkranken, wenn sie keine Besserung ihres Zustandes empfinden, unzufrieden werden, und eine Aenderung ihrer Lage wünschen.]

Was den zweiten Punkt des Sanierungswerks, die Erhaltung der Widerstandsfähigkeit der bereits Infizierten betrifft, so richten sich die Massnahmen nach dem jeweiligen Krankheitszustande.

Der Schutz der Gesunden schliesslich ist im Zusammenhange mit der Fürsorge für den Kranken durchführbar; die Hauptsache bleibt die räumliche Trennung, die durch das eigene Krankenzimmer ermöglicht wird. Peinliche Sauberhaltung der Krankenzimmer, Auswurf—Beseitigung, Auskochen der Wäsche und der Gebrauchsgegenstände begegnen im Hause keinen Schwierigkeiten. Wenn die Frauen über die Notwendigkeit solcher Massnahmen in der richtigen Weise belehrt werden, so sehen sie in der Regel auch mit der grössten Sorgfalt auf deren Durchführung. Die meisten Schwierigkeiten bereitet selbst bei vorgeschrittenem Stadium die Trennung der Bettgemeinschaft zwischen Ehegatten; durch die Lieferung besonderer Betten vermag man auch hier vieles zu bessern.

Die Sanierung jeder einzelnen Familie erfordert eine jahrelange eindringende Fürsorgearbeit, die Fürsorgestellen müssen jeden einzelnen Fall jahrelang im Auge behalten; auf diese Weise werden die Fürsorgestellen allmählich die wahren Zentren der Tuberkulosenbekämpfung, in welchen die gesamten Tuberkulosenfälle des Bezirkes registriert werden. Um die Fürsorgestellen bis auf die höchste Grenze ihrer Leistungsfähigkeit zu bringen, ist es nötig, dass sie auch die offiziellen Zentralen für die Tuberkulose-Anzeige werden.

Auf diesem Wege würde sich meines Erachtens allerorten die Anzeigepflicht regeln und zwar müsste die Anzeige obligatorisch für alle Fälle der offenen Tuberkulose, und facultativ für alle Fälle von geschlossener Tuberkulose werden. Wenn die Anzeige an die Fürsorgestelle gemacht wird, so

verliert sie vollkommen ihren polizeilichen Charakter, und erhält zugleich einen Wert für den Kranken selbst, indem nämlich nach erfolgter Anzeige die Fürsorgestellen einerseits die Fürsorgemassnahmen für den Kranken selbst in die Wege leiten, und andererseits die Ueberwachung der Verhütungsmassregeln übernehmen. Denn wir dürfen nicht vergessen, es handelt sich hierbei nicht um Verhütungsmassregeln, die Wochen dauern, sondern um solche, die Jahre dauern, und ohne Fürsorge werden wir nie die Vorbeugungsmassregeln durchführen können. Aus diesem Grunde lege ich soviel Wert darauf, dass die Fürsorgestellen die behördlichen Zentren der Seuchenbekämpfung werden. Die bisher mit der Tuberkulose gemachten Erfahrungen berechtigen zu der Erwartung, dass es möglich ist, auf diesem Wege die Tuberkulose auf ein Minimum herabzusetzen, indes ist es dabei dringend erforderlich, dass durchwegs auch gegen die Lungentuberkulose die bewährten Grundsätze der Koch'schen Seuchenbekämpfung zur Durchführung gelangen; indem wir den tuberkulösen Menschen zum Angriffspunkt machen, und alle Bekämpfungsmassnahmen nur dem einen Gesichtspunkt, der Unschädlichmachung des spezifischen Infektionsstoffes unterordnen, gewinnen wir eine feste Richtschnur für unser Handeln und gesicherte Grundlagen für eine systematische Bekämpfung. Allerdings dürfen wir nicht darauf rechnen, dass nun in ganz kurzer Zeit die Tuberkulose aussterben wird, dazu ist sie eine zu chronische und vor allem zu tief in den Familien eingewurzelte Krankheit; auch darf die von der Milch drohende Tuberkulosegefahr nicht ausser Acht gelassen werden, aber wo die Tuberkulose systematisch bekämpft werden soll, da ist meines Erachtens nach die Fürsorge die einzige mögliche Form, um die Tuberkulose entsprechende Förderung der Seuchenbekämpfung dauernd unter Kontrolle zu halten.

In diesem Sinne erlaube ich mir einer hochverehrlichen Sektion die nachfolgende Resolution zur Annahme vorzuschlagen:

Resolution Kayserling.

I. der Internationale Tuberkulose-Kongress in Washington ist der Ansicht dass—

Die systematische Organisation der Tuberkulosebekämpfung die Schaffung von Zentralen nach Art der Fürsorgestellen erfordert, welche die Aufgabe haben:

1. Die Verbreitung der Tuberkulose zu ermitteln;

2. Die Bekämpfungsmassnahmen nach den Grundsätzen der Koch'schen Seuchenbekämpfung zu leiten und zwar in dem Sinne, dass die nichtinfektiösen Tuberkulösen davor bewahrt werden, infektiös zu werden, und dass die Infektiösen im hygienischen Sinne unschädlich gemacht werden.

II. Der internationale Tuberkulose-Kongress ist der Ansicht, dass es zur Erfüllung der obenbezeichneten Aufgaben erforderlich ist, dass:

1. Die Fürsorgestellen die offiziellen Zentralen für die Tuberkulose-Anzeigen werden, und dass

2. Bei jedem festgestellten Fall von offener Tuberkulose die mit dem Erkrankten in derselben Wohnung lebenden Familienmitglieder auf Tuberkulose untersucht werden.

Resolution Kayserling.

I. The International Tuberculosis Congress in Washington is of the opinion that:

The systematic organization of antituberculosis measures requires the founding of centers, similar to the dispensaries (Fürsorgestellen), the objects of which are:

1. To ascertain the prevalence of tuberculosis, and

2. To conduct the antituberculosis measures, according to the principles laid down by Koch for combating infectious diseases, in the sense that the non-infectious tuberculous are prevented from becoming infectious, and that the infectious are made innocuous from the hygienic standpoint.

II. The International Congress is of the opinion that in order to fulfil the above-mentioned object it is necessary that:

1. The dispensaries (Fürsorgestellen) become the official centers for tuberculosis notification, and

2. That in every case notified, of open tuberculosis, all members of the family of the patient, living in the same dwelling with him, are to be examined for tuberculosis.

DISCUSSION.

Mr. Alexander M. Wilson (Chicago): Coming as I do into this discussion as a layman, it would seem to be best if I confine myself to a description of the dispensary scheme we have worked out in Chicago.

Early in the dawn of the new interest in tuberculosis, in 1903, under a committee of the visiting nurses of Chicago, a series of tuberculosis dispensaries, so called, were opened in the district offices of the Bureau of Charities. These did not prove successful, for several reasons. In the first place, ten dispensaries dissociated from other medical work sprang into existence overnight, before the medical profession was alive to the importance of even special clinics for tuberculosis in the general medical dispensaries. Moreover, the full technic of the tuberculosis dispensary was not adopted. Nurses were not in attendance during the clinic hours, and no vigorous effort was made to bring the clinics to the attention of persons who should resort to them, so that they quickly lost interest to the physicians who had at the beginning taken up the work with considerable enthusiasm. Within a

few months no physician was in regular attendance at any of these clinics, and the occasional patients who happened to come were referred to the physicians' private offices.

The idea of establishing a tuberculosis dispensary on accepted lines did not die out, however, although it later received a decided check on the abandonment, because of its cost, of a scheme to build a model dispensary on a narrow strip of property given to the Chicago Tuberculosis Institute for this purpose.

The summer of 1907 saw the birth of the present system of tuberculosis clinics, which will be described somewhat at length, for the lesson it may contain to other communities that may desire to establish a tuberculosis dispensary system at the very minimum of cost.

The Chicago Tuberculosis Institute stands to its community in the relation of the committees or associations that have been formed to combat tuberculosis in other cities. Its work is chiefly educational, although it maintains at Naperville a sanatorium with 28 beds, the only such place in Illinois where poor patients may be treated. This is a small institution, incapable of expansion to meet the full needs of the city or State for sanatorium facilities. The Institute is bending every effort to persuade the public authorities to establish ample sanatorium and hospital facilities for all classes of tuberculosis patients.

The Institute would also welcome the establishment of one or more large municipal clinics for tuberculosis; but while waiting for the public authorities to come up to the mark, it has not been thought inexpedient to undertake in a large way the provision from private funds of dispensary facilities. Accordingly, beginning with the Rush Dispensary last November, the policy of establishing separate tuberculosis clinics at the general medical dispensaries was adopted, and has been developed with such vigor that there are now seven dispensaries in Chicago which have their special tuberculosis clinics.

Each clinic is housed, rent free, in one of the general dispensary buildings; five are run in connection with the large medical schools of the city. They are distributed geographically so as to serve all parts of the city.

Following is the list of dispensaries:

On the North Side:
Chicago Polyclinic Hospital Dispensary,
174 East Chicago Avenue.
Tuesdays and Fridays, 2 P. M. to 4 P. M.
On the West Side:
Central Free Dispensary (Rush Medical College),
757 West Harrison Street.
Wednesdays and Saturdays, 11 A. M. to 12 M.

West Side Dispensary (College of Physicians and Surgeons),
Corner of Congress and Honore Streets.
Tuesdays and Fridays, 11 A. M. to 12 M.
West Side Dispensary of the Jewish Aid Society,
Corner Morgan and Maxwell Streets.
Mondays and Thursdays, 3 P. M. to 5 P. M.

On the South Side:

South Side Free Dispensary (Northwestern University Medical School),
2431 Dearborn Street.
Mondays and Thursdays, 10 A. M. to 12 M.
Hahnemann Hospital Free Dispensary,
2811 Cottage Grove Avenue.
Mondays and Thursdays, 2.30 P. M. to 4 P. M.
Stockyards Free Dispensary,
823 West Forty-Seventh Street.
Tuesdays and Saturdays, 9 A. M. to 10 A. M.

The physicians in service at these clinics are selected jointly by the medical school or dispensary staff and the Chicago Tuberculosis Institute, and, for the most part, are men in the department of internal medicine at the medical schools. They have access to the laboratories connected with the general dispensaries. Several of the clinics are open to students, and it is expected that special courses on tuberculosis in each of the medical schools will soon be offered, with opportunities for studying the social side of the problem that never before were presented.

The nurses are supplied by the Chicago Tuberculosis Institute. After being in operation six months it is found that one nurse at each clinic is able to do the work, but before the end of the year additional nurses will be needed at the busier clinics.

There are eight nurses in the employ of the Institute at the present time, the extra nurse assisting at all clinics during the clinic hours and spending the rest of her time assisting in the work of visiting in the homes of the patients.

At the clinic the nurse takes the family, personal, and social history of each patient. This gives her an opportunity to gain the confidence of the patient and furnishes the basis for the intimate personal relationship that must follow if the nurse is vitally to affect the habits of the patient. She is present while the physician is giving his instructions to the patient, so that she may go into the home with all his authority to carry out his directions.

Two half-days in the week cover the time spent by the nurse in the clinic. The remainder of her time is spent visiting the patients in their homes, attempting to secure the conditions of diet and rest in the open air that are prescribed in each individual case.

The nurse wears a uniform while on service in the clinic, but in her visits she dresses so as not to betray her calling. This is very desirable in keeping the good-will of the patients, and is permissible because bedridden cases and others too sick to continue attendance at the clinics are transferred to the care of the Visiting Nurse Association.

Besides the records, medical and social, which are kept at the clinic, a condensed record of each case is immediately sent to the office of the Institute, where it is compared with a card index of all cases known to the Visiting Nurse Association and to all the Institute's special clinics. This prevents waste of the nurse's time in visiting patients who may already be known to another nurse.

The nurses report by telephone to the central office each morning and meet the superintendent in his office one morning in the week for an hour's conference. The superintendent attempts only to direct the social side of the nurses' work, advising when charity should be asked to help and what charity should be appealed to.

In less than seven months 1400 patients have been examined at the several clinics.

The tuberculosis clinic is fundamental to any intelligent effort to grapple with the tuberculosis problem in a large city. Home treatment, which, after all, must continue to be the most common treatment for many years to come, can be put into effect in a large proportion of cases with results that keep up the courage of physician and nurse; preventive work can be carried on intensively in the very spots where most needed; and children and other members of the family can be reached often before the disease has gained a foothold.

Dr. Charles Templeman (Dundee) wished to emphasize one important function of dispensaries not hitherto mentioned, in that the dispensary has not alone or entirely a medical aspect, but also a social one. There is a tendency in England to minimize the effect of the factor of personal infection in favor of those of environment and heredity. This is a great mistake; personal infection is by all odds the most important factor. In Dundee they have established a dispensary modeled closely upon that of Dr. Philip in Edinburgh. The position of affairs in Scotland generally is most advanced in this sense: that any local board, whether urban or rural, is empowered by simple resolution to adopt all those measures which are now recognized to be of value in this crusade, and which are at present in force in New York, such as compulsory notification, the building of sanatoriums, hospitals, dispensaries, and so on. He pointed out that while the burden of building these institutions is at present too great for the local rates, yet they are bound to come. Scotland has this advantage: that it possesses already this local permission to adopt all necessary measures, as above indicated, by simple resolution.

Dr. Stafford (Dublin): I have been empowered by governmental authorities in Ireland to investigate the question of antituberculosis measures, preparatory to the introduction of special legislation in Ireland, and after very wide examination have come to the conclusion that the scheme of Dr. Philip, in which the dispensary is the pivot of the whole work, is much the best available at the present time.

Dr. Paul Krause (Jena) emphasizes the distinction between the American "Dispensary," the French "Dispensaires," and the German "Fürsorgestelle." The dispensary is chiefly a bureau for the examination and notification of tuberculous patients, who are sent from there to sanatoriums, hospitals, etc. The "Dispensaires" are similar to the out-patient departments of the polyclinics in Germany, and undertake the treatment as well as the examination of patients. In contradistinction to them, the German "Fürsorgestelle," first established by Pütter, eliminate all treatment of the patients, and in this way all competition with privately practising doctors is avoided. And on this account the latter voluntarily direct their tuberculous patients to the "Fürsorgestellen." There have been established gradually in Germany about 176 "Bureaus for Notification" of tuberculous patients, and only recently there have been established in the Grand Duchy of Baden alone 534 new ones. Besides the regular examination of tuberculous patients, examinations of their families, and of people living with them in their homes, are undertaken. Those recognized as tuberculous are kept under permanent observation. The observation is principally in the hands of specially educated nurses and medical students (tenth semester). With the half of taxes for the sick, municipal appropriations, establishments provided by the insurance laws, and charitable organizations, the sick are generously provided for. In Berlin alone, for instance, there are 60,000 tuberculous patients under permanent observation.

Dr. Philip, in closing the discussion, expressed his pleasure that all seemed to agree that the dispensary was a good thing. He himself is of the opinion, and has stuck to it for the last twenty-one years. The kernel of the matter lies in this—that the dispensary is the center of all operations, from which wide ramifications extend in many directions. In and by itself the dispensary is of small value. In his earlier remarks he omitted one point. One hears much concerning the advisability of compulsory notification. He could only say that, in this respect, the dispensary occupied a very prominent place, whether notification is or is not compulsory. In former times in Edinburgh, under voluntary notification, it has been found that 70 per cent. of the notifications came through the dispensary; now, under the compulsory plan, 50 per cent. of the notifications still come through the dispensary.

COMPARATIVE VALUE OF THE DISPENSARY AND THE SANATORIUM TREATMENT.

By Prof. Dr. F. Egger,
Basle.

Dispensaries and sanatoriums are both instrumental in combating tuberculosis, but each institution solves only a part of the problem. Neither are the aims of the two institutions by any means the same; on the contrary, they differ in quite essential points.

To begin with, we will briefly define the aim and purpose of the two institutions.

Sanatoriums serve for the reception of curable, or at least improvable, cases of pulmonary tuberculosis. Their patients enjoy the most favorable conditions of hygiene and diet. The climatic factors should also be the most favorable; frequently, however, they are not so, as, for various reasons, sanatoriums cannot always be erected in places where the climate offers special advantages.

In some sanatoriums specific therapeutics are practised; in others, not.

A large number of German institutions, namely, those erected by insurance companies, do not aim at converting patients already unable to work into healthy individuals capable of earning their own living; they seek to prevent patients threatened with tuberculosis from becoming incapacitated for work. This principle influences to a great extent the choice of patients sent to these establishments. In German sanatoriums we therefore find cases in the first stage.

Another aim of the sanatoriums is to educate and instruct tuberculous patients. These should be taught the rules according to which they have to live on leaving the sanatorium, and which are to protect them and those about them from the spread of tuberculosis.

Dispensaries are not, like sanatoriums, organized according to one uniform plan. The best known dispensary is the model establishment of Dr. Calmette, the founder of this class of institute. Its mission may be described as follows: A dispensary does not give consultations or prescribe medicaments; its task is to get into touch with persons suffering from tuberculosis by means of a judicious propaganda suited to the circumstances of the population, to endeavor to obtain their attendance at the institute, and to give them, as long as may be necessary, advice for themselves and their

families. When they become unable to work, the institute is to provide them with food, clothing, bedding, pocket-spittoons, and antiseptics, and to disinfect and cleanse their dwellings. When necessary, it should procure better housing for them and cleanse their linen, in order to prevent other members of the family becoming infected; it should take steps to obtain for its patients the aid of their employers, of insurance companies, and of private charities, with the view of placing them, when curable, in sanatoriums when past help in institutions for the incurable.

Other dispensaries, certainly only a few, give their patients specific treatment; others, again, possessing no funds of their own, limit themselves to obtaining help for their patients from other quarters.

A very expedient plan has been conceived and put into action by the Berlin Inquiry-bureaus and Dispensaries for the tuberculous. Acting on the principle that each infectious disease should be combated according to its special mode of transmission, they strive to prevent the formation of tuberculous centers, and to root out such as already exist. Whenever a person is proved to be suffering from open tuberculosis, they make it a rule to subject all the other members of the same family to a thorough examination. This mode of procedure shows that the children of tuberculous parents frequently play the part of bacilli-bearers. When once the extent of the infectious center has been ascertained, precautions are taken to make the infectious persons innocuous, that is to say, they are sent to sanatoriums or hospitals, or, if that is not possible, the patient is isolated in his own home. This is done by so improving his social status that he can live and sleep in a room by himself. Further, the wife is instructed as to how the patient's sputum, his washing, his spittoon, and the vessels in which he takes his food should be treated; the dwelling should be kept spotlessly clean, etc. The formation of contagion centers is prevented by guarding consumptives suffering from the closed form of tuberculosis from becoming worse and developing the open form of the disease. In some cases the regulation of the hygienic conditions surrounding the patient suffices; in others a sojourn in a forest convalescent home or in the country is necessary. It is especially important that children should be sent in due time to children's sanatoriums or to seaside homes. A regular and thorough examination of consumptives suffering from closed tuberculosis makes it possible to take steps in due time, that is to say, to place the patient under treatment immediately he is observed to be suffering from the open form of the disease.

Let us endeavor to compare the results obtained by the two institutions.

The difficulty of the comparison is enhanced by the fact that dispensaries are not supposed to give medical treatment at all. This rule was probably decided on, in order to prevent disagreements between dispensaries and the majority of doctors. In reality consumptive persons under treatment by

dispensaries are—by means of the pecuniary assistance granted them, and the better food and lodging provided for them—influenced in regard to diet and hygiene in a way that may be considered equal in value to treatment received on the lines of a sanatorium. It is of little account whether medicaments are prescribed or not. We have plenty of reports and statistics of the results of sanatorium treatment, but nothing reliable relating to dispensaries. I have examined a large number of reports received from dispensaries. Some give no exact figures as to results. Others give no information as to the stage of the illness in which their patients were at the time of treatment. Others, again, send a number of their patients to sanatoriums, and quote the result attained there as the outcome of their own exertions.

The results of all the sanatoriums in Germany were published by the German imperial insurance office in 1903.

This report shows that 77 per cent. of all the patients treated in sanatoriums were discharged with good results, but that five years later only 33 per cent. of these good results proved to be permanent. This latter figure formed the basis of a criticism which, with Cornet as its chief representative, has been urged against the sanatoriums during the last few years. The work of Dr. Klebs, "How far has the sanatorium treatment of tuberculosis proved successful?"* shows us that echoes of this criticism have also reached America.

I will not enter into the refutation of this criticism by doctors of the sanatoriums, but I insist on the fact that the results of many sanatoriums are much better. Permit me to quote two examples of sanatoriums which are especially well known to me.

First, the Basle Sanatorium, in contrast to the German sanatoriums, is situated in the favorable high Alpine climate of Davos. Not merely light cases are sent to this sanatorium. I myself am at the head of the committee which has to select patients for Davos. From the very first (since 1896) I have acted on the following principle—which is not always recognized in Germany, but which lately has met with a few supporters (Schröter, Frankenburger): No consideration should be paid to statistics of results in determining the acceptance of a patient, but only to the beneficial results to be expected in each individual case. Consequently one-third of the consumptives sent to Davos belong to the first stage, two-thirds to the second and third stages. The following figures will show how many of those who were discharged during the years 1901 to 1905 were fully capable of work at the end of 1906:

Patients of the I stage	89.2 %	Total, 62.8%
" " " II stage	51.25%	
" " " III stage	16.25%	

* St. Paul Med. Journal, 1907.

Of the 262 patients discharged during the years 1901 to 1905, whose state of health I controlled, at the end of 1906, 70.2 per cent. weighed more, 3.4 per cent. weighed the same, and 26.4 per cent. weighed less than when they entered the sanatorium. The Swiss sanatoriums in the cantons of Zürich and Berne show similar figures with regard to permanent results.

Next I submit to you the following figures, taken from the statistics of a German institute, the Baden Insurance Institute at Friedrichsheim. I do so because they apply only to patients in whose sputum tubercle bacilli had been found. At the end of five years the number of patients able to work was:

For patients of the I stage.....in 1900, 55.5%; in 1901, 81%; in 1902, 80%
" " " " II stage..... " " 43.7%; " " 27%; " " 56%
" " " " III stage..... " " 15.5%; " " 22%; " " 17%

Could all the sanatoriums show similar results, the criticisms directed against them would, in a great measure, cease.

With regard to dispensary treatment, there are but few serviceable statistics at our disposal. The dispensary "Emil Roux," in Lille, reports for the year 1903 the following result:

	Patients Treated.	Improved.	Stationary.	Worse.	Died.
I stage.....	32	21.8%	37.5%	12.5%	28.1%
II stage.....	99	19.2%	24.2%	21.2%	35.3%
III stage.....	21	4.8%	14.3%	23.8%	57.1%
Total.....	152	17.8%	25.7%	19.7%	36.8%

There being no reliable statistics to show the results of dispensary treatment, the results attendant on the treatment of tuberculous patients in polyclinics have been compared with the results of sanatorium treatment (Hammer and Croissant for Heidelberg; Stadler for Marburg; H. Burckhardt for the polyclinic at Basle). It is true that most of the polyclinics have not such effective means at their disposal for the combating of tuberculosis as dispensaries have. They can instruct patients able to attend the polyclinic, they can prescribe symptomatic remedies, but they have not the means of improving the social condition of the patients or of disinfecting their dwellings, their linen, etc. For this reason the results of polyclinical treatment cannot at present be compared with those of dispensaries. Hammer's report in 1902 affirms most surprisingly that the tuberculous patients treated at the polyclinic in Heidelberg showed no worse results than those treated in sanatoriums.

Croissant, after observing a larger number of patients at the Heidelberg polyclinic, is said to have corroborated this statement at the end of 1907.

Croissant certainly states that 77.3 per cent. of those treated in sanatoriums show good results, in contrast to 53.6 per cent. of those treated only in polyclinics. "With some little explanation," as he expresses it, "the lasting results of sanatorium treatment do not far surpass those obtained by polyclinical treatment."

This looks rather suspicious, for it is a well-known fact that, by means of some adaptation, any statistics, especially those dealing with small figures, can be so fashioned as to prove whatever one wishes to prove.

My former assistant, Dr. H. Burckhardt, at my instigation made an investigation of the medical reports at the Basle polyclinic (1906).

The general polyclinic at Basle differs in some essential points from other polyclinics. It is a social organization founded on a legal basis. In Basle any person in receipt of a yearly income of less than 1200 frs. has a right to polyclinical treatment; that is to say, he has the right, in all cases of illness, to demand the aid of the polyclinic doctors. This is afforded him, not only in ambulatorium, but, if necessary, he is visited at his home, admitted into the hospital, sent to a sanatorium or into the country, just as may be deemed advisable. The polyclinic doctors also do their best to obtain for their patients the aid of private charities, assistance in the form of food and fuel, etc. The dwellings and clothing of patients are also disinfected free of charge.

Our sick-list is so large that we were not only able to compare a large number of patients in different stages, but, without especial selection, to compare patients of the same ages.

Our investigations are based upon written reports of the cases under notice. They are the results of personal observation, and not in any way the product of query-sheets. Finally, our investigations are the outcome of nine years' observation.

To be brief, I will now only quote the closing sentences of Dr. Burckhardt's work. He found that:

First: Patients treated in sanatoriums show for the first year or two a smaller rate of mortality than those treated in polyclinics.

Secondly: Patients treated in polyclinics show a much larger rate of mortality during the first year or two. Later it is about the same as in the case of those treated in sanatoriums.

Thirdly: Patients treated in sanatoriums show, on the average, a capacity for work three times as great as those treated in polyclinics.

Quite recently (1908) Frankenburger* drew a comparison, worthy of notice, between the treatment in dispensaries and sanatoriums. He is convinced that in Germany there are many sanatoriums which only admit patients in the first stage of tuberculosis, and he believes that the greater number of these, consisting as they do of suspects and persons suffering from

* Münch. med. Wochenschrift, Nov. 17 and 18, 1908.

latent tuberculosis, do not need sanatorium treatment, but fill the places of such as really require it. In his position as doctor of the dispensary at Nürnberg he has observed that these first-stage cases, and also some of the second stage, show as the results of dispensary treatment not only a subjective, but also an objective, improvement in their general state of health and lung condition.

Frankenburger infers: That for patients of the first stage, above all for suspects and for persons with latent tuberculosis, sanatorium treatment is not essential. For such patients the same results might be achieved by means of ambulatory treatment, sojourns in forest convalescent homes, hygienic sleeping accommodation—in short, by means of the general assistance to be obtained at a dispensary. Expenditure for each patient would be so slight that assistance might be given to a much larger number of persons requiring it. The contradictory results of these investigations may be attributed to the fact that in our Basle sanatorium we treat many more advanced patients than they do, for instance, in Heidelberg.

For this reason the Basle sanatorium, compared with others, shows less favorable results. As I observed before, Frankenburger's investigations prove that light cases can be treated just as well in dispensaries. Already in the year 1902 Rumpf* demonstrated that among the patients sent him by Hammer from Heidelberg there were many less advanced cases than are, on the average, sent to the sanatorium. He inferred from this that, on the whole, there could not be a great number of serious cases at the Heidelberg Polyclinic.

Before closing, I should like to draw attention to another point of contact between sanatoriums and dispensaries. They both serve to teach and educate their patients.

The results of this form of education cannot be expressed in figures. There can be no doubt, however, that the practical instruction received during a stay of some months at a sanatorium is of more value than the advice given at a casual consultation at the dispensary. On the other hand, the disinfection practically carried out by the officers of the dispensary must achieve much more than the theoretical instruction of the sanatorium.

This mutual supplementary work of dispensary and sanatorium is the chief outcome of our investigations. To-day we no longer say sanatorium *or* dispensary, but, wherever the campaign is taken up seriously against tuberculosis, we demand dispensary *and* sanatorium—the one to assist the other in carrying out the task assigned to both. With regard especially to treatment our report shows that the task of the two institutions may, in future, be modified as follows:

The dispensaries shall see that patients in the first stage—if the disease

* Jahresbericht der Heilstätte Friedrichsheim, 1902.

is not active or progressive—are not, as hitherto, sent to sanatoriums; they shall treat such patients by improving and regulating their mode of living by keeping them in forest convalescent homes during the day, and so on. Consumptives with active tuberculosis, and especially advanced cases, shall be sent to sanatoriums, if, after previous treatment at a dispensary, an improvement is to be expected. The period of treatment shall be extended for such patients, and after their discharge they shall again be placed under the care of the dispensary, so that, by means of an improvement in their mode of living, they may have a guarantee for the lasting effects of the sanatorium treatment.

Again, if the sanatoriums are to admit only cases of active tuberculosis, and no longer suspects or persons with latent forms of the disease, they should be fitted up regardless of cost, and that which Klebs finds fault with, namely, that the erection of sanatoriums costs too much, should no longer be a reproach. The "outdoor sleeping structures" he suggests are highly appropriate for the treatment of light cases, but would hardly be effective for cases of the II and III stages.

In accordance with these suggestions, if we divide the task of treatment between dispensary and sanatorium, we shall certainly find a good solution to at least a part of the tuberculosis problem, namely, to the important question: How to treat the patients.

Rêsumé.—It is difficult to draw a comparison between the results of sanatorium and dispensary treatment. Dispensaries are supposed, on principle, not to occupy themselves with practical treatment. By means, however, of improving the social, hygienic, and dietetic position of their patients, they give a treatment which is in accordance with sanatorium principles.

If the majority of cases to be compared are *serious* cases, then sanatorium treatment achieves better results. If *lighter* cases are in question, we come to the conclusion that just as good results can be obtained by dispensaries or polyclinics.

Hence it follows that in future a large number of patients with latent tuberculosis, of suspects, etc., in fact, of just such cases as have hitherto filled the sanatoriums, can be treated in dispensaries. The sanatoriums would thus be relieved, and could be used for serious cases of active tuberculosis; also for such II and III stage cases as show promise of improvement. The sanatoriums must, of course, be appropriately fitted up. In conclusion, dispensaries and sanatoriums must mutually supplement and assist each other. Patients discharged from sanatoriums should not, on their return home, forfeit the good result of their sanatorium treatment through unfavorable conditions of life. They should be energetically assisted by dispensaries.

THE MUNICIPAL HOSPITAL FOR ADVANCED CONSUMPTIVES IN BOSTON.

By Edwin A. Locke, A.M., M.D., and Simon F. Cox, M.D.,
Boston.

Through a comprehensive organization under municipal control, the city of Boston is attempting to solve the local problem of controlling tuberculosis. This campaign has been organized along the broadest and most comprehensive lines, and brings into coöperation all the public and private agencies which are directly or indirectly concerned in this special work. Since the State provides ample sanatorium accommodations in the State Sanatorium at Rutland for all consumptives in the incipient stage, our plan has naturally been made broad enough to include the care of all other cases. It is the purpose of the organization to have examined and permanently recorded at the Out-patient Department (dispensary) of the Boston Consumptives' Hospital, as a central bureau, all cases of tuberculosis in the city, except those who may have a private physician. So far as possible, the incipient cases are sent to the State Sanatorium, in some instances the board of the patient while there being paid by the Consumptives' Hospital, and in all cases the family kept under supervision. All other cases remain under the control of the Consumptives' Hospital, the particular disposition being in accordance with the scheme described below.

While admitting that the great mass of the consumptive poor must of necessity be treated and supervised in their homes, we believe that hospital care should be provided for certain classes; *i. e.*, first, all destitute cases; second, all those who, because of ignorance, carelessness, or indifference, are a menace to the community; and, third, the majority of all dying cases. The strict isolation of all these classes we believe to be absolutely essential to the control of the spread of the disease, and are therefore attempting to furnish institutional treatment for a very large class of the advanced consumptives. For these various classes our plan makes certain provisions which are perhaps somewhat unique, and in part, at least, overcome the various serious difficulties attending such work. We are at present carrying out plans for the erection of a series of institutions adapted to this purpose. Some of these are already finished, others are now being built.

With reference to the hospital facilities needed, we have roughly divided all advanced cases into four general groups:

1. *Those in the last stages, or the hopeless, and, in many instances, dying cases.* These, in consequence of the late stage of the disease, in which the sputum is, as a rule, proportionately more abundant, are clearly the greatest danger to others. As a result of the extreme poverty which so commonly accompanies the progress of the disease, they are frequently destitute, and live under conditions which are most favorable to contagion to others. They are, in short, the most dangerous foci of infection. For all such a permanent hospital, so built and equipped as to be best adapted to the carrying out of the most exact prophylactic measures, and to afford the greatest possible comfort to the patients, is necessary. In any large center there is always a considerable number of ignorant, careless, and indifferent consumptives, who can be properly supervised only when under the restrictions of residence in a hospital. When once admitted, all such cases, with but few exceptions, should be permanently detained, forcibly if necessary.

It is to be remembered that for this class of consumptives the same hospital accommodations are needed as for those conditions treated in an acute hospital. Since so many of the patients will die in the hospital, it is inevitable that its reputation should suffer and a certain prejudice arise in the minds of the class for whom it is built. Every attention should be given to overcoming this by making the wards attractive and by providing every possible comfort for the unfortunate afflicted. All of these considerations unavoidably add to both the initial expense of construction and of maintenance.

2. *A far larger group of ambulatory, moderately advanced consumptives, who, while incapable of regular work, yet enjoy a reasonable degree of health.* In a few of these there are reasonable prospects of a complete arrest of the disease, and in a considerably greater percentage of restoration to partial working capacity. Here the permanent hospital above mentioned, while it may offer adequate advantages for the best results of treatment, is not suitable for the care of this class, because of the association with the most hopeless. The expenses of construction and maintenance of such a hospital are also unnecessarily great. Being less advanced, they are, as a rule, not such prolific centers for the spread of the disease, and are not so frequently the victims of extreme poverty. Many have reasonably good homes, where they can remain at night under favorable conditions. If constantly under a well-regulated, hygienic-dietetic régime during the day, and properly supervised in their homes while there, most satisfactory results can be obtained. Such provisions can be made at a minimum expense in the sanatorium day camp to be described later.

3. *Many in this ambulatory stage, however, either have no homes or such*

as are entirely unsuited to their needs, and, besides the treatment furnished by the camp during the day, must have provisions made for their care at night also. Probably the best and most inexpensive type of institution with this end in view is the "cottage hospital," or "lean-to." If properly constructed and located, the patient can be given every comfort, and the sanatorium treatment made possible. The grouping of these three types of institutions together under a single management greatly facilitates the transfer of patients from one to another, according to the improvement or advance of the disease.

4. *A miscellaneous group, for various reasons unable or unwilling to leave their homes for treatment.* Many are more or less regularly engaged in some occupation; others have responsibility in the home which cannot be given up or transferred to others, and still others are unwilling, though at liberty, to undergo treatment outside their homes. While it must be admitted that the results from this method are less satisfactory, yet surprisingly good results can be obtained by home treatment under the direction of a tuberculosis dispensary. The dispensary nurses visiting in the homes can supervise the treatment laid down at the visit to the clinic, and attend to the carrying out of measures to the end that the other members of the family shall be protected. When adequate hospital treatment is once furnished for the advanced consumptives, this group will become a considerably smaller one, for the general public will soon perceive that the hopeless can be best cared for in a hospital, and the less advanced offered greater assurance of improvement.

The Boston Consumptives' Hospital Plan.

The Boston Consumptives' Hospital, a distinct city department, is under the management of a board of seven unpaid trustees, appointed by the mayor. The entire group of institutions is administered by a single executive head (superintendent), and the medical work by a chief of staff and twenty assistant physicians. A uniform system of records is in use in all departments of the hospital.

Nearly two years ago the trustees of the Boston Consumptives' Hospital purchased an estate of fifty-five acres in Mattapan for $65,000, and immediately laid plans for the development of a comprehensive group of buildings, as follows: a central hospital of six ward buildings, a permanent day camp, a group of cottage hospital wards ("lean-tos"), an administration, domestic, and pathological building, chapel, laundry, nurses' home, and central power station. With the limited funds so far furnished by the city ($307,000), only the beginning of the group has been made, *i. e.*, a central power station, the day camp, one cottage hospital, and a central hospital of two pavilions. The estate is in a quiet suburb of the city, easily accessible

by the electric or steam-car lines, and in every respect is ideally suited to the development of the plans for the hospital group. On the highest portion of the land, far removed from the street, the main hospital is being built, and at a distance of a few hundred feet in front, on land sloping to the south and sheltered to the north by immense boulders of pudding stones and a grove of large trees, are located the first cottage hospital and the day-camp building.

(A) *Out-Patient Department (Dispensary).*—This department is situated in the center of the city (13 Burroughs Place), in the most favorable location possible with reference to those sections of the city where tuberculosis is most prevalent. It is our purpose to make the out-patient department or dispensary the central bureau, where all cases shall first be examined and permanently recorded. When discharged from any of these hospitals, the patient returns to the dispensary, in order that a permanent record may be kept of him and his whereabouts, and that he may remain under supervision. Through coöperation with the Board of Health, the Boston Association for the Relief and Control of Tuberculosis, and the three other tuberculosis dispensaries in the city, we are attempting a complete registration of all cases of tuberculosis in Boston.

A four-story house was leased by the trustees, renovated, and adapted to the needs of a tuberculosis clinic. The first clinic day was September 11, 1907. The dispensary is open four mornings each week from 9 to 12 o'clock, Saturdays being reserved for children. An evening clinic is contemplated. Six physicians and four nurses are in attendance on each clinic morning.

Each patient is carefully studied, and as a routine receives a systematic examination, including the throat and nose. On the day following the visit to the out-patient department the patient is visited in the home by one of the dispensary nurses, and a full report is made on special record cards to the department of the social conditions. As a result of all these investigations, the most suitable disposition possible is made of the patient. The early cases are sent to the sanatorium; the far advanced, so far as is possible, to one of the many hospitals receiving this class. Obviously, the majority of advanced cases will not or cannot enter an institution, and these are put under home treatment. They are required to report at the dispensary at stated intervals, and are carefully supervised in their homes by a nurse from the clinic. Over nine hundred consumptives are at present under this form of treatment. For the purpose of this supervision, the city is divided into districts, and to each is assigned a nurse from the clinic. The visiting nurses' work is in constant coöperation with the Associated Charities, Board of Health, City Charities, and all benevolent associations and organizations in their respective districts. At present, twelve regular nurses are employed in this work under the supervision of a superintendent

of nurses, herself a trained social worker. Each nurse attends the regular monthly conference of the Associated Charity workers for her district.

It is the policy of the out-patient department to seek relief for the needy through already existing charitable societies, as it is evident that relief can be given more economically and wisely in this way than through a special department established by the Consumptives' Hospital. Milk is, however, furnished gratis by the dispensary to poor patients especially needing it, the expense being met from the general appropriation for maintenance. Approximately nine thousand quarts are dispensed each month.

The details of work of the out-patient department do not differ in essential respects from those in vogue in other special tuberculosis clinics, and are too well known to merit enumeration here.

(B) *Hospital for the Far-advanced or Dying Cases.*—At the beginning of our work the most urgent need was felt for beds for the consumptives in the last stages of the disease, and consequently the earliest efforts of the trustees were directed to the erection of a hospital for this class. For reasons stated above, this is the class most needing care, and for whom isolation is most necessary. In the development of plans for the hospital, therefore, two objects were constantly kept in mind; namely, the care of the patient and the provisions for the carrying out of precise prophylactic measures. The care of the advanced consumptive in the last stages of the disease differs essentially from that adaptable in the less advanced and ambulatory patient. The type of building suitable for the terminal case chosen by the trustees after consultation with the leading specialists in tuberculosis combines comfort to the sufferer with simplicity of management.

The hospital is of the pavilion type, with two-story ward buildings facing south, and connected by open corridors. The service rooms are placed in the center of each floor, thus dividing the otherwise large ward into two small ones of fourteen beds each. This arrangement was adopted essentially because of the economy in administration which it affords and the obvious advantages of relatively small wards. The administration portion includes a store and linen closet, bowl-room for washing of hands and brushing of teeth, serving-room, or diet kitchen, bath-room, utensil-room, and toilet-room. All these rooms are equipped in the latest and most approved manner, including a separate ventilating system and arrangements for thorough disinfection. On the roof is a large mattress-room, provided with glass roof and sides, where the mattresses, pillows, and blankets can be sunned and aired. It is so equipped that it can be thoroughly disinfected with formaldehyd gas. Between each two pavilions is a veranda built out from the connecting corridor, and at the southerly end of each ward building is a wide piazza, sufficient in size to accommodate all the beds in the ward.

The entire structure is of absolutely fireproof material. The foundations

and walls are of reinforced concrete. The building is plastered on the inside to a height of one foot from the floor with a mixture of Keen and Portland cement brought to a smooth surface. This wainscot is brought to the floor in a concave base and forms a close joint with the linoleum and terrazzo. All angles are rounded. Above this, the walls and ceiling are of gypsum fiber plaster. All the floor beams are steel, the partitions of terra-cotta, and the lathing of metal. The floors are made of reinforced concrete smoothed and leveled with cement; and covered in the wards and administrative corridor with battleship linoleum cemented down to the concrete floor, while the administration or service rooms are of terrazzo laid on the concrete floor. No wood architraves are used about the doors and windows. Here the plaster rounds to the door or window-frame and is carried under these frames. A half-round strip is fitted to the frame, making a tight joint with the plaster. The windows are triple hung and extend from 2 feet 6 inches from the floor to the ceiling, thus affording a maximum of sunlight. By this means the usual transom over the windows is avoided, and the upper sash can be used as a transom. The doors are of the usual hospital type, and are wide enough to allow beds to pass readily. The wood finish is straight-grain white oak veneer, carefully and fully filled. Vacuum cleaner service has been installed, with outlets conveniently placed to permit of ease in operation.

The corridors connecting the ward buildings have concrete foundations up to the water-table, like the ward buildings. Above they are of wood. The floors are covered with steamship-deck duck laid in paint and covered with several coats of lead and oil paint. The southerly side is permanently open; the northerly side is provided with a portable partition, easily removable.

The building will be lighted by electricity with emergency gas outlets. The wards are lighted by means of reflected light from a reflector hung from the ceiling, supplemented by individual lights from the walls over each bed.

The second ward building, immediately to be built, is of the same general type, but instead of open wards of fourteen beds each, are small wards of four and five beds each and single rooms. The construction and finish are similar to those in the first building.

(C) *The Sanatorium Day Camp.*—Early in July of the present year a permanent day-camp building was opened, adjacent to the main hospital above described. It is of wood, 150 by 36 feet, one story in height, and unfinished on the inside. An open veranda, 16 feet wide, provided with rolling canvas curtains overhead, runs the entire southerly side of the building. The building includes a store-room with refrigerators, a large kitchen, a dining-room for patients, a nurses' dining-room, a rest-room for men and one for women, lavatories, a clinical laboratory, a laryngological room, a linen-

room, a nurses' office, an office for the resident physicians, and a large examining-room. The present arrangement provides one hundred and eighty places in the dining-room, but two hundred and fifty can be made. Heat and light are furnished from the central power station.

The camp is situated on the slope of the rising ground, and is sheltered to the north by ledges and boulders and numerous trees, thus offering unusual opportunities for rest for patients in the open air at all seasons of the year. At least two hundred patients can be in regular attendance, and more than twice as many furnished food from the large kitchen. The cost of the day camp, including equipment, was $14,000.

The routine of treatment is practically identical with that employed in the sanatorium. The patients are required to be in attendance at the camp not later than 8.30 each morning. On arrival, the patients report at the office, where their temperature and pulse are taken. A breakfast consisting of cereal, with milk and sugar, milk (coffee on the colder days), crackers, bread and butter, is served at 9.30. During the forenoon the time is largely given up to rest in the open air, although games are permitted when the condition of the patient will admit, and graduated exercise is also prescribed. Dinner is served at 12.30, and includes soup, meat or fish, potatoes and one other vegetable, bread, butter, milk, and a simple dessert. Following the noon meal, all patients are required to remain absolutely at rest in a reclining chair for one hour. At 4 P. M. the afternoon temperature is taken. A supper of cold meat (fish, eggs, etc.), fruit, milk, crackers, bread and butter (on cold days hot cocoa) is served at 4.30. A special diet of milk and eggs is furnished to patients as prescribed by the physician in charge. During the winter months the patients leave the camp for their homes from 4.30 to 5; in the summer, from 5.30 to 6.

At entrance to the camp the patient is given a steamer-chair and three blankets, each bearing his number, which remain his property so long as he continues a member of the institution.

Two of the assistant physicians are in constant attendance at the camp, as well as two graduate nurses. At present the supervision of the patient in his home is done by the visiting nurses in the out-patient department, but in the near future it is expected that a third nurse will be assigned to the camp, who shall devote her entire time to this important work. The most rigid discipline regarding attendance and faithfulness in carrying out the treatment ordered is maintained. Delinquents are systematically followed up by the visiting nurses.

(D) *The Cottage Hospital.*—The present cottage hospital is a one-story wooden structure, similar to those in use in many of the sanatoriums, and consists of a central portion and wings or wards. The central portion comprises an assembly-room, locker-rooms, two shower-baths, a tub-bath,

six lavatories and four water-closets, an emergency ward of two beds, a linen-room, and a nurses' office. The wards are 60 by 18 feet, and each contains a single row of fifteen beds. Along the entire front of each ward is a wide veranda, which is separated from the wards only by a glass partition consisting of wide triple-hung windows extending from the floor to the roof. Along the north side of the wards is also a row of double-hung windows 4 feet from the floor. The walls are of plaster, as in the ward building, and the floors of first-quality maple. It is heated by steam and lighted by electricity. The total cost, including equipment, is $15,000.

The cottage is designed for the moderately advanced cases, for whom it is necessary to furnish accommodations for the night as well as treatment during the day. Food for the patients will be prepared and served in the day camp, which is immediately adjacent, and precisely the same routine of treatment will be carried out. It is hoped to build a group of cottages about the camp as a center.

SECTION II.

Clinical Study and Therapy of Tuberculosis—Sanatoriums, Hospitals, and Dispensaries (*Continued*).

FIFTH DAY. MORNING SESSION.

Friday, October 2, 1908.

Symposium On

DAY CAMPS; NIGHT CAMPS; HOME TREATMENT; HOUSING; SANATORIUMS FOR THE WELL-TO-DO.

Section II of the International Congress on Tuberculosis was called to order by the President, Dr. Vincent Y. Bowditch, at half-past nine o'clock.

DAY CAMP FOR CONSUMPTIVES.

By David Townsend, M.D.,
Boston.

Until recent years there has been very little or no provision in this country, in the fight against tuberculosis, for the type of case which for one reason or another is unsuitable for the incipient hospital or sanatorium, and yet is not sufficiently advanced to require treatment in an advanced hospital or home.

Germany early recognized the necessity of some such place where cases of the above type could be taken care of. In 1900, at the suggestion of Drs. Becher and Lennhoff, of Berlin, the first "Erholungsstatt," "Walderholungsstatt," convalescent home, or day camp was opened by the Red Cross Society. This was at Jungfernhaide, in the neighborhood of Berlin, and was for men only. Since 1900, many more such camps have been started throughout Germany by various organizations. These camps are

intended only for those persons who are convalescing from acute diseases, after discharge from a hospital, and who are not in a condition to resume work, for those who are constitutionally frail and delicate, and for those who are run down from overwork. Such camps are especially suitable for tuberculous patients. There are separate camps for men, for women, and for children. The site of these camps is usually a piece of park land of 100 acres, loaned by the park department, rent free. The equipment consists of a Döcker'sche Barracke, for administration and housekeeping department, with all the necessary accommodations for water, lavatories, and closets; this is loaned by the Red Cross Society. In addition, there is a pavilion, open on one side, and equipped with hammocks, reclining chairs, etc. A matron is at the head of the camp, and there is a cook, a maid, and a night watchman. A competent physician examines the patients and visits the camp daily, or several times a week. The patients come between 8 and 9 each morning and return at 7 in the evening. The first camp for children was opened in 1902, at Schönholz, and in August, 1904, there was established in Charlottenburg, near Berlin, an open-air or forest school for children. Here children predisposed to tuberculosis, or who are weak or sickly, in addition to being taught the laws of hygiene, are given systematic instruction in the open air, for two hours daily, and are thus enabled to regain their health and strength without losing their schooling. The German camps are open from May to October of each year. In January, 1905, however, the plan was extended, and a camp was established for men, to be open the year round. The patients in these camps receive two lunches of milk, bread, and butter, one in the morning and one in the afternoon, and a dinner in the middle of the day. The running expenses are met as follows: by the public sick lodges (Kasse), by the municipal poor board, particularly in the case of children, by the Free Ward Fund of the Society of Public Sanatoriums (for those who cannot afford to pay), and by the patients themselves. A large proportion of the cases admitted to the camps are tuberculous—33⅓ per cent. in Frankfort, 35½ per cent. in Hannover, 56 per cent. in Posen, and 70 per cent. of all the cases in Berlin. On May 1, 1907, there were 67 day camps in operation throughout Germany and 3 open-air schools.

In the summer of 1905 the Boston Association for the Relief and Control of Tuberculosis decided to make the experiment of establishing a day camp in Boston, modeled on those in use in Germany, particularly in Berlin. It was my good fortune to have charge of this camp. The camp was opened on July 6th, and was, I believe, the pioneer one of its kind in this country. It was at first planned to keep the camp open only two months, but as the experiment proved a success, the camp was continued four months, closing October 31, 1905. The spot chosen was an orchard, 1½ acres in area, a

part of an old estate, within 3 miles of the State House, and with an elevation of about 220 feet. This the association was enabled to secure through the courtesy of the Robert B. Brigham Hospital trustees. A similar camp was operated on the same site by the association in 1905. This camp was opened May 23, and closed October 31, 1906. In 1907 the association moved its camp to the property acquired by the city for the new Municipal Consumptives' Hospital, and this site was made available through the courtesy and generosity of the trustees of this hospital. The street-cars passed the entrance and the site was six miles from the State House. This camp was opened June 5, and closed February 1, 1908. In each case the camp was supported by private and public donations.

The camp was only for cases of pulmonary tuberculosis, and the capacity was 75. The patients were sent to the camp from the various out-patient departments of the hospitals, from dispensaries, from private physicians, and from the various charitable societies. Each patient was expected to pay twenty-five cents per day, or that fraction of this amount which he could afford. As a matter of fact, very few were able to pay more than their car-fare, and even this, in some cases, had to be supplied. The camp was for men, women, and children, and the type of case admitted was that which for some reason was unsuitable for the State sanatorium, and yet was not sufficiently advanced to require treatment in an advanced hospital or home, *i. e.*, the intermediary case.

The equipment for the three years was practically the same. It consisted of a lean-to kitchen building, including a pantry, on one end the laundry, where the towels used by the patients and by the staff were washed, and on the other end a storage place for wood and coal; a dining-tent 20 by 50 feet, connected with the kitchen by a board-walk; 5 tents, each 10 by 12 feet, one for the care-takers, one for the storage of reclining chairs and blankets used by the patients, one for a dressing-room for the women, and the other two for rest tents for the sicker patients (there were two cots in each of the latter); and a shack 10 by 18 feet, containing the medical quarters and those of the matron. This served the purpose of an administration building. This was an innovation the past season; in the two previous seasons a 10 by 12 tent served for this purpose. In addition there were two sanatories, located close by, one for the men and one for the women; also benches out-of-doors, with basins where the patients washed. This they were required to do before each meal. A simple and satisfactory sputum incinerator was made of a cast-iron ash-barrel, with draft holes in the bottom.

In the medical portion of the shack was done the examining, the weighing, and the laboratory work. The laboratory consisted of a table 1½ by 4 feet, with a shelf over it. On the shelf was an ordinary paper water-pail, which was fitted with a rubber tube 6 feet long, and contained the water-

supply of the laboratory. For a sink we used a simple cast-iron pail; for a lamp, an ordinary spirit-lamp.

The staff of the camp consisted of a physician-in-charge and two assistants, one of whom was constantly on duty each day; a throat specialist, who visited the camp twice a week; a matron, who was a graduate nurse, and an assistant nurse. In addition there was a cook, two helpers, and two caretakers (both tuberculous patients). All except the two assistants, the throat specialist, and one of the caretakers received a salary.

The routine of the camp was as follows: all patients were required to be at the camp by 9.30 each morning at the latest, unless especially excused. On arriving each was given a paper bag and crêpe paper napkins for his sputum (these were burned in the incinerator at night, a fresh supply being issued for use at home). Each patient had his own soap, which was kept in a pasteboard box bearing his name. A fresh box was issued to each new patient and the old ones burned. These were kept in a closet provided for the purpose. At first towels were issued, but later crêpe paper napkins were employed instead. A fresh towel was issued each day. Each patient on arrival in the morning was seen by the matron and every effort made to relieve all worry and anxiety, to gain his confidence, and to make him as comfortable as possible. To this end there were as few rules as possible, the chief one being that under no consideration should a patient expectorate on the ground, either at the camp, coming or going, or at home; disregard of this meant reprimand, persistence, dismissal. Each patient was given individual attention and a careful study of his habits and idiosyncrasy was made. In this way it was known just what each required, when he needed to be encouraged, when to be restrained, and when to be corrected. Each patient was encouraged to confide in the matron and the medical staff, and there was nothing too trivial to receive attention. Too often these patients are considered as so many cases of tuberculosis, rather than so many human individuals, each one presenting different peculiarities. Each patient was weighed once a week (this meant body-weight; the women were weighed with a sheet which weighed $1\frac{3}{8}$ pounds); examined once a month, and oftener if the occasion required. The pulse and temperature were taken morning and evening, and the sputum examined once a month, so far as practicable, for tubercle bacilli. The laryngologist examined all new cases and treated all old cases which needed treatment. All these findings were recorded on the record sheet. Patients with a temperature of 100° or above, or a pulse of 120 or more, were placed in one of the rest tents to insure absolute rest and quiet. At 9.30 A. M. a lunch of milk, bread, and butter was served; at noon there was a dinner of meat, fish, or fowl, potato, another vegetable, a wholesome dessert (preferably made of milk and eggs), and milk. At 4.00 P. M. there was another lunch of milk, bread, and butter. On the cooler

days cocoa or broth was substituted for the milk at the lunches. When needed, eggs were served in addition to the lunches. Each patient was encouraged to drink all the milk possible. On the cooler days blankets and hot-water bottles were furnished the patients. The hot-water bottles were ordinary seltzer bottles, which were donated. Each patient was visited in his home by the nurse of the association and his home conditions regulated.

The patients spent the day in reclining chairs, at rest, or in moderate amusement. For amusement there were books, magazines, quiet games, and daily papers—all donated. Smoking in moderation was permitted to the men, except in cases with severe throat lesions. Those who were able were allowed and encouraged to do light work about the camp. Our standard for discharge, in addition to the condition of the chest, was the ability of a patient to do various kinds of work about the camp, without return of his symptoms, temperature, or loss of weight. In the late afternoon they returned to their homes.

No medicine was employed except symptomatically. Heroin was given to control obstinate cough. The wet-jacket was used in cases of pleurisy, also strapping, or a swathe firmly applied to the chest and a cloth wrung out in cold water wrapped about the throat at night, in some of the laryngeal cases. The results of this method of treatment were most gratifying. After careful consideration it was not deemed advisable to use serum treatment, as the cases were not of the type which would benefit from such a course of treatment, and also as the cases were not under observation night and day. Calmette's ophthalmic reaction was tried in sixty cases.

The chief aim of the camp was educational, and much emphasis was laid on this side of the work. Each one was taught the care of himself and how to prevent infection to others. During the season addresses were given at the camp by various authorities on tuberculosis, hygiene, care of the teeth, etc. As a result of the educational campaign carried on at the camp the following may be of interest:

Out of 252 cases admitted to the camp last season, 209 roomed and slept alone, 38 roomed and slept with some one else, and there was no record in 5 cases (243 of these 252 cases lived in tenements or lodged, and 9 in their own homes).

At entrance, 53 cases came under stage I (this includes children, cases awaiting admission to the State sanatorium, ex-State sanatorium cases completing their cure, non-citizen cases awaiting a vacancy at the State sanatorium, and a few others, who, although suitable, for one reason or another could not go to the State sanatorium); 86 cases came under stage II; 107 under stage III; 3 were non-tuberculous; and 3 were not examined. The classification here used is that of Turban.

At discharge, 30 cases were arrested, 96 improved (30 of whom were able

to work part of each week, although not arrested), 57 stationary (includes cases examined only once, because they remained less than a month, and 3 not examined), 40 advanced, and 29 died.

One hundred and forty-five cases gained in weight, 50 lost, 51 remained the same as last weight or were weighed only once, and 6 were not weighed.

Sixteen cases were under fourteen years of age, 216 between fourteen and forty-five, and 20 were over forty-five years of age. The youngest patient was four years of age, the oldest, sixty-nine years of age.

There was a noticeable improvement in eating and sleeping and a diminution in night-sweats from the start. In the majority of cases the decrease in cough and the improvement in the general condition, pulse, and temperature were marked after a few days at the camp.

In addition to the routine examination of each patient a complete record of his home conditions was filed with his record. This included number in the family, wage of each wage-earner in the family, number of rooms, condition of house, street, and exposure. This was furnished by the nurse who visited the homes. An examination of the other members of the family was made and the results recorded.

During the first season some difficulty was encountered in obtaining cases for the camp, due to the hesitancy of the individuals to leave their homes, and to the fact that they were not educated in its value or importance. After the first season there was no difficulty. In 1907 it was necessary to establish a waiting-list.

The following are the comparative figures for the three seasons:

	1905.	1906.	1907.
Number of days open	123	162	241
Total number of patient-days	3,914	7,522	15,169
Total number of patients admitted	128	196	252
Average daily attendance	31	46	63½
Maximum number of patients on one day	58	72	83
Per capita daily cost	$0.837	$0.638	$0.51

Experience has taught us that the day camp, when properly conducted, is of value: (I) on educational lines; (II) as it removes for a time the sources of infection from the home and the community; (III) as it enables cases which cannot go to a sanatorium, although suitable, to obtain proper care; and (IV) as it helps to complete the cure in some cases which have been discharged from a sanatorium.

As a direct result of this work day camps have sprung into existence throughout the country. The first one was that in connection with the House of the Good Samaritan, in Boston—a hospital for chronic cases admitting only women and children. This camp was opened in May, 1906, and has been in operation, winter and summer, since that time with excellent results. Perhaps the most pretentious camp is that of the city of Boston.

This has been inaugurated as a part of the city's municipal campaign against tuberculosis.

The day camp has proved, in addition to the facts mentioned above, that a case of tuberculosis is not necessarily hopeless until he dies. Many cases in the past have advanced and died simply for no other reason than the lack of proper facilities for their care. The trustees of the Boston Consumptives' Hospital have recognized the importance of this need, and, with the previous successes of the Boston Association's camp in mind, have built a day camp on greatly enlarged and more solid lines. A description of this camp follows.

The equipment consists of a single wooden building or shack, one story high and 150 feet long by 36 feet wide, with a piazza 18 feet wide on the south and east sides. This building is simply made, not finished inside, except where the water-pipes are exposed, to prevent freezing. It is lighted by electricity and heated by steam. At present the heat is supplied by a steam plant in the cellar; later it will be furnished by the central power station of the hospital, which will be located not far distant. The building is divided as follows: at the west end is the kitchen, with all the necessary appurtenances, range, hot-water boiler, sinks, etc.; close by, and leading off the kitchen, is a spacious pantry. Next to the kitchen is a dining-room capable of holding 180 people, with a separate room for the staff and nurses. The kitchen and dining-room occupy practically one-half the whole building. The remaining portion of the building is divided into smaller rooms. There are two rooms, one for the men and one for the women, with wash-room and toilet in the rear. Adjoining these are the administration and nurses' quarters, with a corridor between. On one side of this corridor are two lavatories and wash-rooms, one for the staff and one for the nurses, a laboratory, a throat-room, and an examining-room. On the other or south side is a linen-room, the matron's quarters, and the medical room. This latter room projects a little beyond the main building, giving a clear view of the piazza in all directions. There is a wash-bowl in each of the rooms except the linen-room.

This camp building is as thoroughly fitted out and equipped as any sanatorium, and work similar to that in a sanatorium can be undertaken and carried out. The piazza is covered with a movable awning, which will serve as a protection in hot or stormy weather. The camp is located on the same site which the Boston Association had for its camp.

The advantage of this type of camp construction over that of the tents and shack is its compactness and the opportunity of closer supervision of and contact with the patients. Then, too, it affords a much more comfortable shelter in stormy and cold weather. The disadvantage is the expense of erecting, equipping, and maintaining.

BIBLIOGRAPHY.

1. Das Deutsche Rote Kreuz und die Tuberkulose (Denkschrift für den Internationalen Tuberkulose-Kongress, Paris, 1905), Berlin, 1905.
2. Feis: "Die Walderholungsstätten und ihre volkshygienische Bedeutung," 1905.
3. Wolf-Becher: "Ueber Walderholungsstätten für Kinder, mit besonderer Berücksichtigung der Tuberkulösen," 1903.
4. Die Erholungsstätten vom Roten Kreuz bei Berlin. Bericht der Abteilung IV für Erholungsstätten über das Betriebsjahr 1905.
5. Nietner: "Der Stand der Tuberkulose-Bekämpfung im Frühjahr 1907 (Geschäftsbericht)," 1907.
6. Third Annual Report, Boston Association for the Relief and Control of Tuberculosis, 1906.
7. Stone and Floyd: "Daily Care of Consumptives at a General Hospital as an Aid to Solving Local Tuberculosis Problems," Boston Med. and Surg. Jour., Aug. 1, 1907.
8. Townsend: "Day Camp Sanatorium for Consumptives, Parker Hill, Boston," Boston Med. and Surg. Jour., Jan. 18, 1906.
9. Townsend, McCarty, and Houghton: "Mattapan Day Camp for Consumptives, Boston, Mass." Boston Med. and Surg. Jour., April 30, 1908.
10. Second Annual Report, Consumptives' Hospital Department of the City of Boston, 1908.

Camp de Jour pour Tuberculeux.—(TOWNSEND.)

Jusqu'à ces dernières années on n'avait fait que très-peu ou même nul arrangement dans la lutte contre la tuberculose dans ce pays, pour aider ces cas qui, pour une raison ou une autre, ne peuvent être admis dans un hôpital ou un sanatorium pour les cas incipients, et, en même temps, ne sont pas suffisamment avancés pour nécessiter un traitement dans un hôpital on une institution pour les cas avancés.

L'Allemagne reconnut de bonne heure la nécessité d'une institution pour ces cas, et en 1900 fut inauguré le premier Camp de Jour ou Walderholungsstätte à Jungfernhaide, près de Berlin, par la Société de la Croix Rouge. Depuis ce temps on en a construit beaucoup d'autres en Allemagne.

En 1905, la Boston Association for the Relief and Control of Tuberculosis ouvrit et opéra à Boston, pendant les mois d'été, le premier Camp de Jour dans ce pays. Un camp semblable fut opéré dans l'été de 1906 et de nouveau en 1907. Ce dernier camp resta ouvert jusqu'en février, 1908. L'équipement de ces camps consistait en une baraque servant de cuisine, une baraque pour le bureau d'administration, 10 × 18 pieds, une tente servant de salle à manger, 20 × 50 pieds, et plusieurs autres tentes plus petites d'une superficie de 10 × 12 pieds chacune. On employait des sacs en papier et des serviettes de papier pour le sputum, et on les brûlait le soir. Les malades avaient deux déjeuners et un dîner par jour. Ils venaient à 9 heurs et demie du matin, et retournaient à la maison entre 5 et 6 heures du soir. Ils passaient la journée dans des chaises-longues ou à des amusements modérés sous la direction d'un médecin et d'infirmières.

Le but principal de ce camp était d'instruire les malades et l'on insistait tout spécialement sur ce point. Des entretiens sur les différents sujets

sanitaires étaient donnés chaque saison par des personnes compétentes. Comme résultat de cette campagne d'instruction, les faits suivants seront peut-être de quelque intérêt: des 252 cas admis au camp dans la saison de 1907, 209 logeaient et couchaient seuls, 39 logeaient et couchaient avec une autre personne, et on n'a pas de rapport sur cinq cas (243 de ces cas vivaient ou logeaint dans des hôtels meublés et 9 vivaient dans leur maison privée). Dès le début, il y avait une grande amélioration dans leur appétit; leur sommeil était meilleur et les sueurs nocturnes avaient diminué. On fit aussi un dossier complet des conditions existant dans les maisons. Ces rapports étaient fournis par les infirmières qui visitaient ces maisons. Les dépenses la première année étaient de $0.83 par malade avec une présence moyenne de 31 malades. La seconde année, elles étaient de $0.638 par malade avec une présence moyenne de 46. La troisième année, elles étaient de $0.51 par malade avec une présence moyenne de 63½.

L'expérience nous a enseigné que le camp de jour, quand il est convenablement administré est très-utile, (1) au point de vue de l'instruction; (2) parce qu'il ôte pour le présent les sources d'infection de la communauté et de la maison; (3) parce qu'il permet de donner les soins convenables à des malades qui ne peuvent pas aller au sanatorium, bien qu'ils en aient besoin; (4) parce qu'il aide à finir guérison, dans certains cas de malades qui ont quitté le sanatorium. Le camp a aussi prouvé qu'un cas de tuberculose n'est pas nécessairement désespére, qu'il y a espoir de guérison jusqu au dernier moment, et que plus d'un tuberculeux est devenu tuberculeux avancé et est mort simplement parce qu'il n'a pas pu recevoir les soins nécessaires.

Comme résultat de ces expériences, différents camps ont été établis par tout le pays. Le premier a été celui administré en connection avec la Maison du Bon Samaritan, un hôpital pour les cas chroniques ne recevant que les femmes et les enfants, et situé à Boston. Ce camp a été en opération été et hiver depuis son établissement en May, 1906. La ville de Boston a aussi établi un camp comme partie du plan de campagne municipal contre la tuberculose. Ce camp, croit-on, est le premier camp municipal pour poitrinaires dans ce pays.

NIGHT CAMPS.

By Wm. Charles White, M.D.,
Medical Director, Tuberculosis League of Pittsburg.

In much of our tuberculosis work in municipal and State fields it seems to me we are open to the apostolic criticism of the man who, without telling the naked how to get food and raiment, constantly exhorted them to be fed and clothed. Without telling the tuberculous how to find maintenance for himself and, more especially, those dependent on him, we exhort him to take the cure for longer or shorter periods.

Those we do provide with maintenance we frequently demoralize with idleness in our sanatoriums. It merits objection, it seems to me, that many in charge of the disposition of funds in State and charitable institutions for the tuberculous frequently pauperize by failing compulsorily to utilize the potential energy of the patients of such places. Yet there is scarcely a sanatorium in the country that could not, with benefit to the patient, utilize 33 per cent. of the total potential energy of those resident in the institution. Some provision in board or money could justly be made for remuneration for the work. This is more true to-day when, with little foresight from the standpoint of prevention, the patients admitted to these places must be incipient cases, who in the main grow fat, vigorous, and lazy in a few weeks.

If the statement that "Jeder Mann am Ende ist ein bischen tuberculose" be true, then, of course, for every one that is sick of tuberculosis and knows it, there are one hundred who never know they have it, yet continue working their lifetime and seem none the worse for it.

Since long before the excellent systematic work outlined by Paterson at Frimley, or even before the differences of Brehmer and Detweiler on the question of exercise, we are familiar with the records of cases who, under advice, or contrary to advice, rode horseback or took active exercise in the open air and yet made excellent recoveries.

I fear we are apt to forget, especially in our dispensary work, being overwhelmed by the number of yearly deaths, the equally important lessons to be learned from such facts as the above.

My attention has been called to this lately in making provision for those whom, by our present ability to make early diagnoses, we find by examining

the households of those consumptive cases reporting at the dispensary. These cases are unsuspected by the individuals themselves, and are of varying degree of intensity from incipiency to far advancement. They have for the most part in the past been *en masse* urged to take the cure in a way which is obviously impossible when we stop to think. We have frequently had in the hospital in Pittsburg from three to five of one family.

I do not wish my remarks to be taken as in any way bearing upon febrile cases, although I have frequently known cases of moderate fever up to 100° of evening temperature improve only after being given one hour or two of light work daily. The best law to follow, of course, is that cases of tuberculosis be treated by the physician, as nearly as possible, individually, psychically, and physically, as if there were in each case a separate malady.

My reference is more especially to the following groups of cases, which every properly run dispensary must yield in comparatively large numbers:

First: Those not conscious of their lesions, who, from their existing social condition, must continue working: (*a*) those with open lesions; (*b*) those with closed active lesions; (*c*) those with closed inactive lesions.

In this group are included the majority of those who are found by examining the households of the tuberculous who report at the dispensary. Many of these refuse to stop work, many cannot, many need not. I could enumerate instances in great number. This I need not do, as all who have to do with the tuberculous are only too familiar with such cases.

Second: In the second group are those who are conscious of their lesion, but who will not, or from their existing social condition feel that they cannot, stop their work. These are too often young women, the sole support of a widowed mother, their earnings enabling her to have a home; or mothers often required at home in the daytime on account of children, whose absence would break up the household which their presence holds together. Also many who cannot be persuaded of the seriousness of their sickness; feeling able to work, they are often induced, in order to save property on which they have already paid a good deal, to continue earning.

Third: In the third group are those who are conscious of their lesion, not working, but able to work. Among these are—(1) those who have been frightened by what may be called the defects of our modern crusade; (2) those whose disease has been arrested, but who have been demoralized by our present sanatorium methods; and (3) many who have grown accustomed to the support of others at home and now refuse to work. These are able to maintain their position through the fear which they are able to infuse into those at home.

From the foregoing groups are many who, if they feel they are under supervision, are willing to work. Many who can be induced to accept for

a time the advantages of sleeping out at night with two meals daily to help them in recovery. Many who, under the jurisdiction and moral suasion of a hospital, do better than under the influence of poor home surroundings. Many who are boarding and whom the boarding-house refuses longer to keep, etc.

For all of these we have found a night camp to be a very feasible and valuable adjunct to the work of the Tuberculosis League, and can recommend to other municipal organizations interested in this work.

For this work in the past we have utilized simply the beds in the hospital shacks and not a separate department, as the name might indicate. The patients report at the end of the day's work; their temperature and pulse are taken and recorded, when they retire to their reclining chairs or bed to rest until supper. After supper they are at rest until bedtime, 9 P. M., when they sleep out of doors. The time of their return to the hospital varies in compliance with the requirements of their work. The work is arranged as nearly as possible with the employer to suit the case. In the morning they rise, dress, have their temperature and pulse recorded, have their breakfast, and go to work. They arrange for lunch out of the hospital. Chest examinations are made and recorded as with all cases in the hospital. The advantages to the patient are evident; constant medical supervision and advice; two nourishing meals daily; compulsory rest and open-air sleeping facilities.

The cost of maintenance is difficult to arrive at under the present management, as it is included with the general hospital per capita maintenance, but it cannot be much less than ordinary hospital maintenance. I look upon this, however, as of minor importance. The basis of our work has been to cure and prevent as much tuberculosis as possible with the least amount of pauperization of the patients. The patients of the night camp are supposed to pay what they can, which amount we help them to arrive at after gaining a knowledge of their liabilities and earnings. In many cases it is nothing; in no case is it very much.

Of more importance is the economic value of the camp. It saves the labor of the individual to the State, often prevents the necessity of the State or municipality providing for others dependent upon the patient, and, best of all, the patient himself frequently makes very rapid progress toward arrest of his disease.

Its sociological value is of equal importance. We are more and more beginning to grasp the truth that the tuberculosis problem is not concerned with that malady alone, but is a crusade which includes a reconstruction of the whole social fabric of a municipality. In the present instance the night camp preserves the self-respect of the individual. He attracts the admiration often of his associates and furnishes an example of heroism

growing rarer in the past few years among our tuberculous. It takes real heroism to admit to your associates that you are tuberculous. The night camp is, besides, a very potent instrument in appealing to those most valuable citizens, the charitably inclined. These are so often fooled that they become skeptical of good done with their contributions, but where they see an effort being made to use funds in such a way as this, it has some power in restoring their confidence.

Perhaps of maximum importance is the educational value of the night camp: first, upon the patient who learns the methods of prevention of the spread of tuberculosis and disposal of sputum; second, upon all with whom he comes in contact when he can be persuaded to follow the teaching with which he is made familiar; and, third, in overcoming that sad state of affairs, a product of our method of crusade, the fear of employers and employees of even the careful consumptive. I have faith that through the night camp much will be done to help the hardships which now are so commonly thrust upon the consumptive, preventing often his doing the very things which we ask him to do. You and I, his teachers, are too often guilty—unconsciously, perhaps—of sharing this popular fear, which does so much to defeat our ends.

Campamento Nocturno.—(White.)

Relación del trabajó á la tuberculosis.

El peligro de olvidar la gran energía potencial de los tuberculosos.

Al pensar en el millón de los que mueren, hay probabilidad de olvidar los diez millones que recuperan de la tuberculosis.

Todo dispensario debiera persentar muchos de los grupos siguientes de enfermos tuberculosos:

I. Aquellos que aun trabajan, inconscientes de su lesion; de estos, 3 grupos:
   (*a*) Los que padecen tuberculosis franca.
   (*b*) Los que padecen tuberculosis encubierta.
   (*c*) Los que presentan lesiones curadas.

II. Aquelleos que aun trabajan conscientes de sus lesiones y que por sus condición social actual se ven obligados al trabajo.

III. Aquellos que no trabajan, conscientes de sus lesiones, pero ábiles aún para el trabajó diario de 4 á 8 horas.
   (*a*) Casos viejos de sanatorio.
   (*b*) Casos detenidos á domicilio.

De todos los grupos anteriores hay:

1. Muchos que necesitan vigilancia.
2. Muchos que no reciben el cuido apropia do en el lugar donde residen ya sea en sus hogares ó casas de huéspedes.

Para éstos, sistema mas racional y de mas utilidad es el campamento nocturno.

Manera de administrar el campamento. Costo de mantenimeinto. Valor sociológico. Valor educativo. Valor económico del campamento nocturno.

Camps de nuit.—(WHITE.)

Rapport entre le travail et la tuberculose. Danger d'oublier la grande énergie potentielle de la tuberculose.

A penser au million de tuberculeux qui meurent, il y a une disposition à oublier les dix millions qui guérissent de la tuberculose.

Chaque dispensaire devrait avoir plusieurs d'entre les groupes suivants de malades tuberculeux.

I. Ceux qui travaillent encore, inconscients de leur lésion.
   Parmi ceux-ci, trois groupes.
   (*a*) Ceux atteints de tuberculose ouverte.
   (*b*) Ceux atteints de tuberculose fermée et active.
   (*c*) Ceux qui sont guéris de la tuberculose.

II. Ceux qui travaillent encore, conscients de leur lésion, mais dont les conditions sociales les obligent à travailler.

III. Ceux qui ne travaillent plus, conscients de leur lésion, et pourtant capables de travailler de 4 à 8 heures par jour:
   (*a*) Vieux cas de sanatorium..
   (*b*) Cas arretés à la maison.

Parmi les groupes sus-mentionnés se trouvent:

1. Plusieurs qui ont besoin de surveillance.
2. Plusieurs qui ne peuvent avoir les soins nécessaires chez eux, soit qu'ils habitent dans leur maison à eux, soit qu'ils vivent dans une pension.

Pour ceux-ci, la solution la plus logique et la plus raisonnable est le camp de nuit.

Méthodes pour diriger le camp. Prix de l'entretien. Valeur sociologique. Valeur éducative. Valeur économique du camp de nuit.

Nacht-Biwak.—(WHITE.)

Arbeit in Bezug auf die Tuberkulose.

Gefahr des Vergessens der grossen potentiellen Energie der Tuberkulösen.

Im Denken an die Million, die stirbt, vergisst man leicht die zehn Millionen, die von der Tuberkulose geheilt werden.

Jede Klinik sollte viele von den folgenden Gruppen Tuberkulose aufweisen:

I. Solche, die noch arbeiten und nichts von ihrer Krankheit wissen. Diese zerfallen in 3 Gruppen:
   (*a*) Solche mit offener Tuberkulose.
   (*b*) Solche mit geschlossener, aktiver Tuberkulose.
   (*c*) Solche mit geheilter Tuberkulose.

II. Solche, die noch arbeiten, obwohl ihrer Krankheit bewusst, weil sie durch die jetzigen sozialen Verhältnisse zu arbeiten gezwungen sind.

III. Solche, die ihrer Krankheit bewusst, nicht arbeiten, aber dennoch fähig wären 4 bis 8 Stunden täglich zu arbeiten.
   (*a*) Alte Sanatoriums-Patienten.
   (*b*) Kranke, die sich zu Hause gebessert haben.

In allen diesen Gruppen sind
   1. Viele, die Aufsicht nötig haben.
   2. Viele, die zu Hause nicht die richtige Pflege bekommen können, sei es, dass sie im eigenen Hause oder im Kosthaus wohnen.

Für diese ist ein vernünftiger und sehr wertvoller Plan das Nacht-Biwak. Methode, ein solches Biwak zu leiten: Betriebskosten. Soziologischer Wert. Erzieherischer Wert. Ökonomischer Wert des Nacht-Biwaks.

DISCUSSION.

Dr. Minor (Asheville) remarked that he has little experience among the slum poor, and that to him the question of tuberculosis among the laboring classes is bound up in finding a method by which they can continue wage-earning without relinquishing an attempt to effect a cure. He wishes to ask what the effect of a day's work is on temperature and "languor," and how it is gauged, and how long it is necessary to keep patients at day camps before they can return to work.

Mr. Van Pelt (New York) asks whether it is possible to so arrange the hours of the night and the day camps that one plant can be used for both, thus saving the establishment of two camps. This is interesting to him as an architect.

Dr. John Pitta (New Bedford): We heard about day camps on one hand through Dr. Townsend, from Boston, and of night camps through Dr. White, from Pittsburg. I think I must state that in the city of New Bedford, Massachusetts, last January, we opened a day and night camp. There are patients who come in the morning to go back at night, and others who stay day and night. This is situated in the highest part of the city, on its outskirts, covering six acres of land, one house with two balconies where the

female patients sleep, and a pavilion where the patients have their meals on stormy days and also where the male patients sleep. We have on the north and south sides of these buildings two orchards, where the patients procure good air and sunshine during their rest.

The camp patients, as this institution is situated over a mile from the car-line, are transported to this camp in a vehicle of our own. The milk which is furnished to our patients is produced by our own cows, kept in a barn with our horse. We have a fumigating room for the outside clothing of the patients, so that they will not be dangerous to travel with in the trolley-cars. The towels and bed-linen are sterilized in one of our sterilizers, as are the utensils used in the preparation of food by the patients.

This institution, day and night camp is the only one yet in this country, so far as I know.

Dr. Woodcock (Leeds, England): Day camps and night camps are necessary, and only necessary because there are not enough sanatorium beds available. Speakers at this Congress have not only to-day, but all through the Congress, spoken of treatment by back-yard tents and the like. The necessity to advise back-yard tents is a satire on our civilization. I notice that immediately after the back-yard prescription, cheerful surroundings are immediately advised—one suggestion monotonously follows the other.

Patients who have undergone sanatorium treatment should never be lost sight of, and in most cases should be invited to spend a few weeks annually in a return to the sanatorium. This advice is given by Dr. Walther, of Nordrach, who carefully provides for old patients, and villas stretch up the Nordrach valley for the use of such patients.

Present-day ways of earning the means to live are too hard for all but the absolutely healthy class. This is seen in many cases, apart from the cases of consumption. The railway driver, whose health has ceased to be first class, must either be an invalid for some weeks in the year or he must break down utterly.

There is another form of hospital required in this fight against consumption. I refer to the rest hospital for women—working women. Every medical practitioner knows that working women drag on with their domestic work when, owing to profound debility, they ought to be, not at work, but in bed. The conditions of debility which I have in mind are those chiefly following troubles associated directly or indirectly with maternity. This condition (ask the medical officers of insurance companies) quite frequently ends in fatal tuberculosis. In such a hospital the patient would be one requiring rest in bed or on a couch. There should be no need for surgeons, surgical cases being turned over to the general hospital. The opportunity of selection would allow the physician to direct some of the patients to the sanatorium and tuberculosis dispensary. Most of the patients admitted would eventually be sent home in a greatly improved condition; disease,

especially tuberculous disease, would be prevented, or its onset delayed. Others may and will see many other benefits in such an institution, but all will agree with me in my moderate claim for its usefulness.

Dr. Townsend (Boston), in closing, remarked that both types of camps are valuable. Dr. White's night camps are intended for those who are not sick enough to give up work. He thinks that their combination with day camps is not feasible, for the day camps are meant for those who are almost moribund.

The difficulty he finds with the day camp is in urging the patients to accept charity. This he accomplishes by showing them that early care prevents the whole family from being thrust upon the community later. The chief aim in Boston is to obtain educational rather than medical results. He is convinced that there are cases working all day who would be dead without the help of the night camp. Of course, part of the gain is due to improved food which is furnished at the camp. He feels that the personal efforts of the nursing and medical staff are the most important element in the success of the camp. The first camp consisted of a place to sit down and a place to eat. It is necessary to instruct each individual separately how to live. He gave examples of the educational value of the camp, narrating how one man had asked for fumigation by the board of health before he moved, although he had scrubbed the floors with creolin.

He thinks that it is possible to arrange for day and night encampments in conjunction with large hospitals, and that the hospital and the camp should work together. The day camp is intended to be largely educational, and is planned for those cases which are not suitable for a sanatorium or for a hospital, because they are either too far advanced for the one, or still able to work, and therefore not suitable for the other. The object of the camp is to teach the people to help themselves and to become wage-earners. One graduate from the day camp is doing hard scrubbing, which she did six weeks before leaving the camp.

Dr. White, in closing, remarked in answer to Dr. Minor, that individual cases that are in very bad condition improve at once in the night camps, due to better meals and outdoor sleeping. In one instance a mother and three daughters—two of them employed at cigar-making and one in an office—were taken from a badly arranged home to the night camp. The mother was kept in bed in the hospital. The daughters continued at work, though not early cases, and made a remarkable recovery. His experience is not enough to give his results in figures. He feels that the day camps are especially valuable in preventing pauperization and demoralization, for they save the State the potential energy of the consumptives. He finds that night camps are useful for those cases which are anxious to return to work from hospitals, and tells of an Italian fruit-tender who was able to support his family while at the night camp and still improve.

THE TREATMENT OF TUBERCULOUS PATIENTS IN THEIR HOMES AND IN PLACES OTHER THAN SANATORIUMS.

WITH SPECIAL REFERENCE TO THE PSYCHICAL SIDE OF THEIR MANAGEMENT.

By Chas. L. Minor,
Asheville, N. C.

When our chairman did me the honor of asking me to present a paper on the home treatment of tuberculosis, I felt some hesitancy in accepting; not because the subject was not of great interest to me, but because, by some of the profession, that name has been associated with the views of those who believe that pulmonary tuberculosis can be better treated in the patient's home than in the very best of climates.

Such a view is so much opposed to my experience, and to that, I believe, of the profession as a whole, that I would not wish to seem to support it. If, however, the term, as my title implies, is used to describe the treatment of tuberculosis outside of closed sanatoriums, whether in the patient's home town or in some especially favorable climate, and deals with obtaining for all patients those advantages which were supposed to be obtainable only in special institutions, it is a subject which interests me deeply, and one on which I am glad to have an opportunity to speak, for it is certainly one of the most important in therapeutics, and must be solved if we are to succeed in suppressing this disease.

The hygienic and dietetic treatment is to-day universally recognized as an essential part of the management of pulmonary tuberculosis, and whatever advances we have made, or may yet make, in specific and drug therapy, they may be safely stated to be a fundamental part of any complete and satisfactory treatment.

These methods were worked out originally in closed sanatoriums by such men as Brehmer, Dettweiler, Trudeau, and many others, and it was long the general impression that they demanded the special facilities of such institutions and could not be properly carried on outside of their walls. Patients in their own homes, or living in climatic resorts, but not entering such sanatoriums, have too often been allowed to live very much as they wished,

with no properly strict supervision or discipline, and the difference in the results gotten in cases handled in this slipshod way, as compared with those systematically treated in institutions, has been used to support this view.

Being dissatisfied with the manner in which these invaluable methods were ordinarily applied in private practice, and yet convinced of the absolute necessity of their use, I have for a number of years tried to get for my patients in private houses the general hygienic arrangements and the teaching and disciplinary measures of the closed sanatorium, with results that have satisfied me that we can obtain for our patients, outside of such places, all their essential conditions and their results. Indeed, when we recall the very limited capacity of all the institutions of this sort, the outlook for the majority of the tuberculous, were this not true, would indeed be sad, for but a small fraction of them could possibly get accommodation in such sanatoriums.

Hence, it becomes our duty to encourage the adoption of such methods everywhere, and to urge the profession to acquire that skill in handling pulmonary tuberculosis which has given sanatorium physicians their excellent success; in short, to teach doctors how to manage the hygienic cure outside of closed sanatoriums.

This, then, I take it, is the real aim in the home treatment of tuberculosis, a treatment equally applicable in or out of climatic resorts, and whose value in no way affects the question of the utility of climatic treatment, which, therefore, need not be touched on here.

Since, as noted, this treatment was first and most fully developed in sanatoriums, it will be well to consider what are the special conditions which are obtained there, in order to see if these can be adequately gotten outside their walls.

Analyzed, then, to their simplest terms, these are: (1) The personal medical oversight of the patient. (2) His strict discipline and close supervision. (3) His teaching and his instruction in methods of life. (4) The systematic and hygienic arrangement of his life. (5) His nursing. (6) His proper housing, location, and feeding. (7) Suitable climate. (8) The effect on him of the example of other patients and of the "esprit de corps."

Of these eight desiderata, all save the invaluable effects of the last two can be had in all cases, granted a determined and forceful doctor and a reasonably intelligent, earnest, and obedient patient, in fairly good circumstances. True, to obtain them in a satisfactory degree will unquestionably call for much work on the part of the doctor, a great interest in his cases, and a strong will; for a chronic disease, such as this is, makes great demands on the patience and perseverance of both physician and patient; but if the doctor is willing to enter closely into the lives and to study the personality

of his charges,—and only he who is so willing will succeed with them,—he can get complete control of them, and will find pulmonary tuberculosis as interesting and, if early diagnosed, as hopeful as any other disease; nor will he discover any of that monotonous sameness which is supposed to characterize it.

Let us now consider seriatim these different conditions, which are obtainable in sanatoriums.

1. *Personal Medical Oversight.*—That this is essential, all who have handled tuberculosis will recognize, and hence these patients must not be left to manage their lives according to their own best judgment, with perhaps occasionally a little general advice, but need to see the physician often and to receive instruction and stimulus from him. Many would suppose that unless the physician lives in the house with his patient, seeing him frequently during the day, as does the sanatorium doctor, personal medical oversight could not be had, but I have found this not to be the case, and, if the physician is capable of impressing his will and his personality on his patients, he can get the closest and most detailed supervision and control of their lives by seeing them twice, or at most thrice, a week, and when they are once well trained, once a week is sufficient. Indeed, by seeing our patients too frequently,— as we do if we live in the house with them,— we are apt to lose that objectivity in our attitude toward them which is so important, and to lessen rather than to increase our control.

If the patient is well taught the aims and purposes of the treatment, is convinced of the doctor's interest in his case, and knows that he must report to him every occurrence in a written diary of his life, it is surprising how close the supervision can be.

The use of such diaries or record books is a most important aid in the control of our cases, and it is difficult to keep in sufficiently close touch with patients without their use.

I have used record books now for a number of years, and find that they keep the doctor in most intimate touch with the feelings and doings of his charges, and that through them he will learn of many things very closely affecting their condition, and which it is important for him to know, yet of which otherwise he would never hear.

The patient writes not merely a physical record of the fluctuations of his temperature, the amount and nature of his food, exercise, and amusements, etc.,—for all of which there should be places in the page,—but, and I believe this even more important, a diary of his mental life and of those occurrences of the day which affect not so much his body as spirit.

Such records are of inestimable benefit to the doctor in learning to understand his patient and to guide him wisely, for in no disease is the effect of mind over body more in evidence than in pulmonary tuberculosis, and we

cannot succeed with it if we treat the physical but neglect the mental side of our charges.

In a small percentage of one's cases, the very nervous and excitable, such as are so often our Jewish patients, or in those lacking the moral backbone to face the facts and fight them, their nervousness can be increased by such record keeping, and in them, they must be discontinued; but in a very large majority the keeping of such diaries proves helpful and interesting to the patient, aside from their value to the doctor, and I have had many people assure me that their records stimulated them to obedience and to more faithful living.

The more intelligent the patient, the better will these books be kept; some patients are able to give us a vivid account of all that happens to them, so that we can know exactly all that they felt and did; some are only able to record the bald physical facts of the day, and this poorly enough; while the majority keep a diary which, while not as full as it might be, is a great help to us in following their lives. I devised these record books to be used by patients in private practice, and I had not supposed that they would be applicable to the class of cases which we see in our dispensaries, who are usually of a lower grade of mentality; however, Dr. Joseph Pratt, of Boston, who has adopted them in his admirable tuberculosis class work, has shown that they can be used with most excellent results in these patients, and through his instrumentality they have been pretty extensively and successfully used in numerous other classes and dispensaries throughout the country.

By using such books, whose entries should be carefully scanned at each visit, and by seeing our cases once or twice a week, the supervision of the patients can be perfect, and they will become so interested in their own progress that the treatment is deprived of much of the tedium that can handicap it.

2. *Discipline and Supervision.*—Many excellent physicians are poor disciplinarians, neither giving such detailed instructions as are necessary nor seeing that they are strictly carried out. This, however, is a matter of the personality of the physician, and does not depend upon whether he treats his patients in private or in a sanatorium. Discipline, however close the supervision may be, must rest, save in penal institutions, more on the goodwill and willing coöperation of the patient than on his fear of punishment, and, while the doctor must have a strong will, and be a good disciplinarian, and while the patient should be afraid to disobey him, the discipline will be hollow and unreal if it depends only or chiefly on fear, or is maintained by spying, and can only be satisfactory when the patient obeys willingly, from motives of self-interest and through his confidence in the physician. When such a feeling of confidence toward the doctor exists, and when the

patient is made to realize that he and his physician are fellow-workers toward the same end, and that by disobedience he is only hurting his own chances; when, moreover, he is made to see that getting well is no child's play, and that if he is to recover he must have the force to deny himself, the doctor need have no fear that his orders will be disobeyed behind his back, and no sanatorium can show better discipline than can be gotten with patients thus trained.

3. *Teaching.*—In tuberculosis the relation of the doctor and his patient is, in one aspect, that of teacher and pupil, the latter coming not merely to regain health, but to learn from the former those truths which in after-life will enable him to retain the health he has regained. Hence, the physician who treats tuberculosis must be—I had almost said first and foremost—a teacher, and, like every good teacher, interested, and hence interesting and capable of imparting his knowledge and his enthusiasm.

Granted the ability on the doctor's part to teach, instruction outside of the sanatorium can be most thorough and satisfactory, although, unless our patients are housed together, the individual patient will lose that not inconsiderable part of his teaching which he would get from the example of his fellows. Many physicians do not believe that their patients should know anything about their sickness, but in tuberculosis, as Penzoldt* and many others have insisted, it is essential that the patient should understand something of the nature of the disease he has to fight before he can be expected to deny himself the many pleasures he must forego, or bring himself to live a strictly regulated life.

While it is by no means desirable that the patient should know too much about the extent of his trouble, he will fight his disease more intelligently, and therefore better, if he knows something of the wonderful way in which nature opposes the advance of the enemy, and how her ability to wage a successful warfare depends on the vitality of the individual cells, whose strength or weakness is so largely under his own control.

4. *Systematic and Hygienic Living.*—While it will take great care to secure, outside of a sanatorium, the system and order of such an institution, they can be obtained if the patient be intelligent and the doctor painstaking. He who makes a listless, half-hearted, planless attempt to recover from tuberculosis is sure to fail, but, granted the conditions already dwelt on and a careful oversight by the physician, the individual patient can systematize and live his life as well as those in sanatoriums.

5. *Nursing.*—The necessity of trained nursing in pulmonary tuberculosis depends on the nature of the case. In my opinion, in incipient cases a nurse is not necessary at all save during some intercurrent condition, such as an

* Penzoldt and Stintzing: Handbuch der Therapie innerer Krankheiten, iii, Jena, 1898.

exacerbation of the process or a hemorrhage; but the patient is rather the better for being thrown on his own responsibility and made to think for himself. In advanced cases with much fever, diarrhea, etc., a trained nurse is a necessity and an inexpressible comfort to the sick one, but, save in such cases, her constant presence while the patient is feeling well is a depressing reminder of sickness. Hence it is better to dispense with nurses, save in the cases cited.

6. *Location, Housing, and Feeding.*—It is not always easy to secure for patients, especially if in restricted circumstances, either in their own homes or in resorts, accommodations which are as well arranged as to porches, rooms, orientation, ventilation, etc., as those in the best sanatoriums; but it is surprising what excellent facilities we can obtain for our patients by some study of their homes and rearrangement of their surroundings. If a large southern room, with several windows and a porch opening off from it, can be had, sanatorium conditions can be duplicated; but, if not, by ingenuity in a rearrangement of houses and porches, or the building of shacks, excellent results can be obtained. For those in comfortable circumstances the task is easy, but in proportion as the circumstances of our patients are more and more restricted it becomes more and more difficult, and there is a point below which their financial state sets an almost hopeless handicap on the proper carrying out of this treatment.

Among that large class whose finances prohibit their leaving their home town, much has been done in recent years in Boston, New York, Philadelphia, Chicago, Baltimore, and elsewhere, either by removing them to the outskirts or by rearranging their homes, and the various tuberculosis dispensaries and classes in this country have done splendid work in this line.

The feeding of a patient, whether in or out of a sanatorium, depends on the availability of a good cook and housekeeper, a good market, and a not too empty purse, and if these can be had, a good and varied table is always obtainable; however, the feeding of these cases is so important that the doctor must take pains to satisfy himself as to the existence of these conditions, and not take them for granted.

7. *Suitable Climate.*—It is neither appropriate nor desirable at this time to enter upon the much discussed question of the essentiality or non-essentiality of climate in the treatment of pulmonary tuberculosis. My own view is that climate, while it will always be a secondary factor to proper care, discipline, and feeding, is an invaluable aid in the treatment of this disease, and one which, in all cases which offer possibility of cure, should never be dispensed with if means permit, and that, with proper conditions, it will greatly improve the best results that can be had in a patient's own town. Practically all sanatoriums are in unusually favorable country climates, and most will admit that, other things being equal, a case will do better, the

better the climate in which it is placed. However, while we try to place our sanatoriums in favorable climates, and while those who can afford to get proper conditions there would be foolish not to avail themselves of the added advantages offered by a good climate, the vast majority of cases of pulmonary tuberculosis are compelled, by financial reasons, to get well, if get well they can, in their home town, and in the last two or three years many workers in this line have shown what can be accomplished in the way of amelioration, arrest, or even of cure, in our large cities, if the cases be favorable, and if the physician be only thorough, painstaking, interested, and a good teacher.

8. *Effect of Example and of "esprit de corps."*—The one important factor in the hygienic treatment which cannot be had when we treat the patient in his own quarters is the effect upon him of the example of other patients and of that "esprit de corps" which is developed among them, and both of which are powerful factors in sanatorium results. However intelligent and purposeful, determined and obedient, the patient may be, he will miss much in not having the stimulus which is gotten from living with other patients, who, like himself, are seeking to recover health, and whose example will constantly urge him on to the proper life. All who have handled many cases together know the great assistance which is gotten from the rivalry between them in taking the cure faithfully, the brace to a weak will of the example of others, the encouragement to the discouraged from the good results in other cases, and the mutual assistance of that spirit which animates them all.

True, the single patient is free from the depressing effects of that curse of the pulmonary invalid, symptom-talking, but this is more than counterbalanced by the tendency of the lonely case to brood over his own troubles and to introspect. The only way in which I have been able to get around this difficulty has been, wherever possible, to place a number of patients together in a properly managed house, rather than each in his own house. In such houses they get the benefit of example, etc., though free from the institutional atmosphere which is so distasteful to most American patients, and the brightness and cheerfulness of these houses, if the inmates are properly chosen, is a very great help in the treatment. Therefore, whether in our cities or in resorts, I believe that wherever possible we should try to place our patients together. However, unless they will give it a trial, it is often hard to convince people that such association with others will not be depressing and dismal, though, if we are very careful to place incipient cases only with the incipient and the advanced with the advanced, so as to avoid the discouraging effect which their difference of condition can have upon them, the fact is just the contrary, such houses being unusually cheerful and bright. It need hardly be noted that he doctor must also display tact in sizing up differences of social condition in his cases, as, by placing

together patients too widely separated in this way, there is pretty sure to be friction, dissatisfaction, and trouble.

If the case must be handled alone in his own house, as will usually be necessary in our cities, or with those who are too fastidious to mix with others whom they consider less elegant than themselves, the difficulty arising from the lack of example can only be overcome by redoubled efforts and more careful teaching on the part of the physician, and by more self-control and intelligence on the part of the patient.

As the result of these considerations, I believe that it is evident that, save for the beneficial influence of example and of climate, all the conditions obtained in sanatoriums can be gotten for patients outside of such institutions. I would here, however, make an exception of our very poorest classes and of our criminal poor. For these, owing to conditions not controllable by the doctor, there seems little hope unless our sociologists and philanthropists step in and change or improve for them those surrounding sand habits under which they live and which lie at the root of their sickness. For them, the treatment of tuberculosis is primarily a sociological problem, and the doctor's part in it, however important, is necessarily secondary to that of the civic and social reformer.

Of course, in applying sanatorium methods, as they have been called, the physician who is used to treating chiefly acute diseases will find considerable trouble, for they demand far more care than these, and most doctors find it hard to keep alive their interest in a case after the acute symptoms subside and the changes, instead of being visible from day to day or from hour to hour, are only to be discovered from month to month or at even longer intervals.

It is unquestionably troublesome to have to adjust every small detail of the patient's life, and to fill to some degree the functions of the nurse as well as the doctor, and it is to be feared that the majority of practitioners will therefore always find the treatment of tuberculosis tiresome and unsatisfactory, but it is only by such work that we can expect to get good results.

The Psychical Handling of the Patient.

Turning our attention now to the application of these methods in the home treatment of tuberculosis, it is evident that, since a patient has not merely a body but a mind and a soul, there are two distinct aspects in which this treatment can be regarded, the physical and the psychical, the former concerned with the arrangement of the details of the patient's life and surroundings, the nature of his exercise and rest, his dietary, amusements, occupations, etc.; the latter dealing with his mental capacity and his attitude toward his sickness, his spirit, courage, and will, and his relation to his

physician. The physical part of the treatment is, of the two, the least difficult to carry out and is more generally understood, and I have, moreover, very fully treated of it elsewhere,* as have many others, and it is to-day familiar to all, so that it would be superfluous to take up your time with consideration of its various details. The psychical side of the treatment is much less fully understood and is more frequently neglected, and it is the part which will give us the most trouble when we treat patients outside of sanatoriums, yet it is essential to the success of the treatment, hence I shall to-day confine myself to a consideration of it alone.

It may be approached from two points of view—the one relating to the patient, the other, to the doctor, and I shall here dwell upon the qualities which each will need if the home treatment is to be as successful as that in a sanatorium.

The qualities needed by the patient are, in the order of their importance: (1) Will-power and determination; (2) earnestness and purposefulness; (3) cheerfulness and patience; and (4) intelligence and interest.

1. Of these, *will-power and determination* are unquestionably the first; in their absence the lightest case becomes severe, while with them even a desperate one may have hope. When I speak of will-power, I refer not merely, or chiefly, to that more ordinary type of will which is able to impose its wishes upon others, but more especially to that higher type which can turn its will inward and conquer itself, which can force itself to the difficult denial of pleasure for profit, which can obey tedious orders strictly and closely, and which can compel cheerfulness when all around seems dark. When our patient possesses such a will, we are indeed fortunate; but the doctor should never forget that, even when it is more or less poorly developed, it is in the physician's power to cultivate it, and that he can arouse and enlarge a dormant or ill-applied will and direct it into right channels; and this cultivation of the will in a wise direction is one of the doctor's most important and inspiring duties. What more splendid than to awaken will where before it was latent, interest where there was apathy, purposefulness where there was vacillation, and thus to bring victory out of a case that otherwise would be hopeless? However, we are not seldom made to realize that if the moral backbone of the patient be below a certain level, such induced will and earnestness will not only exist as long as the patient keeps in touch with his source of power, and that if this is removed, he will relapse into his original weakness and spinelessness. Such cases, whatever their physical condition, are hopeless, this being a good example of the survival of the fittest; fortunately, however, they are few.

2. Next to will and determination I would place *earnestness and purpose-*

* N. Y. Medical Journal, Jan., 1899; Dec., Jan., 1902. Zeitschrift für Tuberkulose, Bd. vi, Heft iii, 1902.

fulness. The light-minded patient, incapable of following a fixed aim persistently, and who can never frankly face the facts, he who is never in earnest about anything, and lacks any comprehension of a serious purpose in life, is a difficult problem for the doctor, for such qualities are not easily developed where they are lacking. It has often seemed to me especially difficult to develop earnestness in young girls or in unusually attractive women accustomed to much attention, for too many of them in these days look upon life merely as a playground in which to amuse themselves, and cannot be brought to regard it as a field for noble but arduous work.

3. *Cheerfulness* is an invaluable quality, and, while not essential, for many earnest and excellent patients seem to lack it constitutionally, it can be cultivated to a great extent by the will. The patient who is grateful for every smallest gain, and does not magnify every loss, he who picks out each speck of sunshine to enjoy and tries to shut his eyes to the dark places, he who goes into the fight not whining and believing he will be beaten, but bravely, and hopeful of victory, has already taken a big step toward recovery. It is often inspiring to the physician to see how a patient will labor for cheerfulness and for a sunny point of view when his doctor knows so well how many causes he has for discouragement and despondency; such people are a blessing to the households in which they live, and serve as a source of sunshine to all around them. In this connection it should be noted that the families and friends of our patients should be taught and compelled to keep from them all those sad and depressing occurrences which they seem to take such a pleasure in pouring into the sick one's ears, either by letter or by word of mouth, needlessly and harmfully depressing them; the stupidity of people on this score being sometimes beyond comprehension.

Patience in a disease which runs so slow a course as pulmonary tuberculosis is most important, and he who can quietly and patiently live each day as it comes, uncomplaining and unfretting, will be a comfort to his doctor and a help to himself.

4. *Intelligence and Interest.*—All authors dwell upon the importance of intelligence in a patient, and it is of scarcely less weight than the qualities already dwelt upon, and it is indeed almost inseparable from some of them. There are few things harder for the doctor than to sit opposite a patient whom he is trying to interest and instruct in his own case, and to be unable to awaken one ray of intelligence, comprehension, or interest in his dull, impassive eyes, or to make clear to him the simplest details of his treatment. Such patients cannot be made to properly grasp the principles of their cure or to take that live interest in it which is so important, and they not only get poor results for themselves, but are a dead weight on their physician. On the other hand, the intelligent, wide-awake patient, who, even if uneducated, responds to our efforts in his behalf by a prompt comprehension and coöper-

ation, who grasps our aims and helps to further them, is not merely doing much to assure his own recovery, but inexpressibly lightens the doctor's work.

It is this question of lack of intelligence in the patient which is one of the severest handicaps on our tuberculosis dispensaries and classes, when, as is so often the case, their clientele is drawn chiefly from the ignorant foreigners who crowd some sections of our cities, and whom it seems impossible to awaken to any understanding of hygienic living, or to teach them how they must conduct themselves.

In private practice the intelligence of the patient is more usually sufficient, but even here the results are infinitely improved, other things being equal, when the mind is alert and keen.

If he is by nature enthusiastic, it will be of great assistance in our efforts in his behalf, but enthusiasm is one of those qualities which is born in a man and which cannot be cultivated.

Social and Financial Conditions.

Aside from these mental qualities, we should note two conditions which have great effect upon the patient's prospects of recovery; *i. e.*, his social position and his finances.

As to the former, as is true all through life, the best lies at neither extreme of the social ladder, and the very rich, fastidious patient of the upper ten, who has been spoilt all his life, who has always had his own way, who cannot adapt himself to new conditions, or be happy unless he can surround himself with all his accustomed luxuries, and who is unwilling, even when his life is at stake, to give up his favorite indulgences, or bend his will to that of another, is handicapped in very much the same way, though from a different cause, as is the poor man, who, for want of intelligence or means, cannot get the proper conditions. The best results can be expected with those having more normal social ideals, cultivated and intelligent, but not too much bitten by the society bee. These, neither handicapped by too great a fastidiousness, on the one hand, nor, on the other, by a lack of those qualities which the lower classes miss, will prove our most satisfactory patients. In this class are apt to be professional and scientific men, college professors, and business men, etc., whose pockets, it is true, may not be as well filled as their heads, but who yet have sufficient means to get proper conditions and whose minds are so trained as to enable them to avail themselves of all their opportunities.

A person's education and his hygienic enlightenment are apt to be, up to a certain level, fairly proportionate to his social station, hence those below a certain class make poor patients, owing to their inability to put into practice customs and habits alien to all their past training.

However, many men of the intelligent artisan class make excellent patients, for, in this country, that class contains many with minds used to independent thought, and, though they are hampered by narrow means, they can yet yield good results by taking to roofs, porches, or back-yards, as Pratt has demonstrated, and he has restored many such to a partial or complete working efficiency.

If, however, the disease, in this class of patients, is to be successfully combated, a crusade against the hygienic condition of the average American workshop, and the filthy spitting habits of the average American workman, will have to be begun.

At present thousands of this class yearly fall a prey either to the cupidity of short-sighted employers or to the careless habits of tuberculous fellow-workmen.

Patients who are below a certain social level, who can neither get the proper conditions, however simple, or appreciate them even if gotten, such as our slum-dwellers and our criminal classes, must be handled, as already noted, by the community in charitable institutions, and should, if possible, never return to city life, where they at once gravitate back to their slums and their vices, and, by the rapidity of their relapses, scarcely justify the money paid for their care.

The financial condition of the patient is, of course, of the greatest importance, but, in these material days, this is too self-evident to need much notice. I would only say that patients must be able to spend on board, lodging, and incidentals a minimum of ten or fifteen dollars a week if they are to get proper if simple conditions, while for the artisan class five dollars a week may possibly suffice. Below this point, they become proper subjects for public help.

Relation of Doctor and Patient.

If the doctor is to manage his patient successfully, proper relations with him must be established in the beginning, and therefore our first interview is unusually important. At this time he must be made to realize fully what he has to fight and the physical and mental means with which he is to fight it, and he must be shown the necessity of cultivating those qualities on which I have just dwelt. The absolute necessity of his willing and intelligent coöperation with us should be made clear, as well as the impossibility of getting satisfactory results unless he is willing to be obedient and faithful.

If he is rightly handled in this first interview, which should follow his examination, his confidence in the physician's understanding of his case and of his interest in his welfare will very largely guarantee his obedience. In this first examination and talk the exact details of the life which he must

lead should be laid out for him specifically and clearly, so that there can be no misunderstanding.

Thereafter, each time he is seen there should be a close and careful inquiry into his daily life, by means of his record book and by independent questioning, when errors can be corrected, faithfulness encouraged, and the thorough carrying out of our orders seen to. Thus handled, very few will disobey, but, if any do so systematically, they had very much better be given up, for the doctor need not delude himself in supposing that a patient who three times disobeys specific orders will stop there, and he should not risk his reputation in the hands of a strong-headed, stupid, or dishonest patient. Followed up in this way, there is no difficulty in keeping in close touch with our cases and controlling their lives most thoroughly, and guiding their slow progress toward recovery will never be tedious, but, on the contrary, will prove absorbingly interesting, not only to the patient, but to the doctor.

Qualities Needed in the Physician.

Not every doctor is so constituted as to successfully handle tuberculous patients. To do so demands certain qualities which are not so necessary to the doctor treating acute diseases, and he who may be preëminently successful in treating pneumonia, typhoid, measles, etc., may fail when he undertakes the management of so long-drawn-out a disease as pulmonary tuberculosis.

1. *Personality.*—All writers on the subject have dwelt on the importance, in the physician, in this sort of work, of that indefinable quality which is called "personality"; from the doctor will often have to come the will, the interest, the cheerfulness, and the enthusiasm which his patients need. He must be able to charge them with these qualities as an electric current charges a storage battery, and it will need a strong personality and a large supply of vitality to enable him to fill this rôle.

2. *Will.*—For one who is called upon to control others, it need scarcely be noted that a strong will and forcefulness are desirable, so as to compel obedience if need be; but his discipline should be as little in evidence as possible, and he should be able so to convince his charge of his interest in his welfare, and so make plain to him the reasons for his orders, that he will be obeyed not merely, or chiefly, because the patient fears to disobey, but rather from choice and because he is trusted.

3. *Teaching Ability.*—Since apparent recovery from tuberculosis demands a thoroughly trained and instructed patient who can be relied on thereafter to live wisely and avoid harmful influences, the doctor must have teaching ability, and not merely show his patient what he must do, but fix it in his memory by giving him reasons why he must do it, for no principle of peda-

gogy is better established than that the teaching which gives no reasons for the facts it imparts is lifeless and will soon be forgotten.

The doctor must be able to interest him in what he teaches him, and hence must put it in an attractive form, for, however beautiful naked truth may be, it is unquestionable that the clothing in which she is presented to us can greatly enhance or detract from her charms.

Further, if what we teach him is to stay with him the rest of his life and keep him from imprudence in the future, it must impress him deeply, and we should never forget that he who recovers without having been taught how to retain his recovered health is pretty sure to relapse.

4. *Enthusiasm and Interest.*—If, by good fortune, the doctor is an enthusiast, it will serve to lighten his labor and turn what otherwise might be work into play, and to increase the interest which he can take in his cases, and to be able to feel a lively interest in his patients, not merely as cases, but as human beings, is a great assistance to the physician.

A small minority of one's charges are so unfortunately constituted that it is almost impossible for the physician to interest or be interested in them. These are a constant drag on the doctor and drain him of his vitality, and for such he can usually do but little. The large majority, even if not unusually interesting at first sight, will prove so if we study them closely enough, while a small but blessed minority are possessed of such a personality that they interest us from the first moment and, by their intelligent comprehension and coöperation, make our treatment of them a pleasure throughout.

The importance of detailed work on the physician's part has been sufficiently dwelt upon, and I can only repeat that vague, general directions are useless, and that the closest specification of our wishes is essential.

Much more could be written upon this question of the bearing of the qualities of the patient and his physician upon the success or failure of the home treatment of pulmonary tuberculosis, but my time is limited, and I can only hope that what I have said may make plain the importance of the mental control of our patients.

In closing, let me urge upon the general practitioner, to whom these cases first come, not to regard them as hopeless or to treat them routinely, or to relegate them to that category which he may, indeed, have to treat, but in whom there is no outlook or interest, but always to remember that, if only they are recognized as early as modern diagnostic methods permit, and handled in the way I have suggested, the large majority will prove hopeful and interesting.

Let them be looked on and studied not merely as cases, but as individuals with a personality that will repay study, with qualities which it is in our power to modify for their benefit, and who should appeal deeply to the profession as in their helplessness they come to us for help.

Thus regarded and thus handled, the treatment of our patients outside of closed sanatoriums will reward us with unexpected results and remove from the minds of the profession the false but painfully prevalent idea, inherited from the days when a really early diagnosis was impossible, of the incurability of pulmonary tuberculosis.

Traitement de la tuberculose dans la maison du malade ou dans un endroit autre que le sanatorium.—(MINOR.)

A. Définition de "Traitement à la Maison" selon l'auteur un traitement dans un endroit quelconque hors d'un sanatorium fermé."

B. Le traitement hygiénique et diététique est généralement reconnu comme base de tout traitement rationnel de la tuberculose pulmonaire.

C. Cette méthode ayant été le plus souvent suivi dans des sanatoriums fermés, on a supposé qu'elle ne pouvait être employée comme il faut que dans de telles institutions; mais ce "traitement de sanatorium" comme on le nomme souvent, peut s'employer tout aussi bien hors de ces endroits.

D. Etude des éléments les plus importants de la méthode au point de vue de son adaptabilité hors d'un sanatorium.

Résumé de ces éléments: (1) Surveillance médicale par le médecin lui-même: Stricte discipline. (2) Enseignement exact. (3) Réglementation de la vie journalière du malade d'après les principes de l'hygiène. (4) Influence de l'example donné par les autres malades et de l'esprit de corps. (5) La garde-malade. (8) Emplacement convenable pour l'habitation; la nourriture. (7) Importance d'un climat convenable.

E. Toutes ces conditions, peut-on les obtenir hors d'un sanatorium fermé.

F. Elles peuvent toutes être obtenues à moins que le malade ne soit tout seul dans sa maison; quand les conditions mentionnées sous (4) manqueront. S'il est trop pauvre, un changement de climat sera hors de question; mais on admet en général que, même sans ces avantages spéciaux, on peut obtenir de très-bons resultats.

G. Difficulté du traitement des malades très-pauvres, ignorants et criminels. Question sociologique plutôt que médicale.

H. Dans le traitement d'une maladie chronique comme la tuberculose pulmonaire il faut avoir recours à des méthodes différentes de celles qui sont applicables aux maladies aiguës ordinaires. Les cas de la première catégorie demandent beaucoup plus de soins et d'attention personnelle de la part du médecin et malheureusement les cas chroniques sont souvent trouvés peu interessants, ennuyeux et sans promesse de bons résultats.

I. Les détails de traitement hygiénique et diététique sont trop bien connus pour être mentionnés dans ce mémoire. Ce qu'il y a de plus important ce sont les relations entre le malade et le médecin.

1. Quant au malade: il lui faut la volonté, l'empire sur soi-même, la résolution et l'empressement, la patience et la bonne humeur, une bonne position sociale et financière, du jugement dans la conduite de ses affaires.

2. Quant au médecin; une bonne personne, une forte volonté, la force, la capacité d'enseigner, l'enthousiasme, le dévouement au travail.

Die Behandlung der Tuberkulose im Heim des Patienten oder an anderen Orten als in Sanatorien.—(Minor.)

A. Des Autors Auffassung über die Bedeutung des Wortes "Heimbehandlung" als die Behandlung ausserhalb geschlossener Sanatorien.

B. Die hygienische und die diätetische Behandlung ist jetzt allgemein als ein grundlegender Teil irgend einer und jeder rationellen Behandlung von Lungentuberkulose anerkannt.

C. Diese Methode ist für gewöhnlich in geschlossenen Sanatorien sehr sorgfältig angewendet worden und es ist angenommen worden, dass sie nur in solchen Anstalten befriedigend durchgeführt werden könne, aber diese "Sanatoriumbehandlung," wie man sie oft nennt, kann, wenn genügende Sorgfalt vorausgesetzt wird, ebenso gut ausserhalb solcher "Oertlichkeiten" durchgeführt werden.

D. Eine Studie der grundlegenden Züge dieser Methode bezüglich ihrer Anwendbarkeit ausserhalb der Sanatorien.

Diese Grundzüge sind (1) sorgfältige persönliche ärztliche Uebersicht, strenge Disziplin und genaue Ueberwachung. (2) Gründliche Instruktion. (3) Systematische und hygienische Massregeln, das Leben der Patienten betreffend. (4) Wirkung des Beispiels anderer Patienten und des "esprit du corps." (5) Krankenwärterinnen. (6) Richtige Haushaltsdurchführung und Ernährung. (7) Passende klimatische Bedingungen.

E. Eine Erwägung in wiefern alles dies ausserhalb geschlossener Sanatorien erreicht werden kann.

F. Alles kann erreicht werden, ausgenommen der Patient ist in seinem Heim allein, und vermisst die unter (4) erwähnten, oder er ist so arm, dass er die unter (7) erwähnten nicht haben kann, aber es ist anerkannt, dass selbst wenn die dadurch erreichten Vorteile nicht vorhanden sind, dennoch in vielen Fällen vorzügliche Resultate ohne sie erreicht werden können.

G. Schwierigkeiten in der Behandlung der sehr Armen, Unwissenden und Verbrecher. Bie Behandlung dieser ist eher eine soziologische als medizinische Frage.

H. Die Behandlung einer chronischen Krankheit wie Lungentuberkulose verlangt andere Methoden, als die bei den gewöhnlichen akuten Krankheiten anwendbaren. Die ersteren verlangen mehr detaillierte Arbeit und nähere persönliche Beziehungen und unglücklicherweise werden oft chron-

ische Fälle von den Aerzten als uninteressant, langweilig und, was das Resultat anbetrifft, fruchtlos betrachtet, was eine sehr irrige Ansicht ist.

I. Individuelle Details der Durchführung einer hygienischen und diätetischen Kur sind so wohlbekannt, dass hier nicht weiter darauf eingegangen werden kann. Die wichtigste Sache ist die persönliche Eigenschaft und Beziehung von Patienten und Arzt, und auf diesen beruht alles.

Zuerst in Bezug auf den Patienten sind die nötigen Eigenschaften, wenn er sich erholen soll, seine Disziplin, Unterricht, und Durchführung der Behandlung. Zweitens in Bezug auf den Arzt, seine Persönlichkeit, und die Qualitäten, die er braucht wenn er sich mit tuberkulösen Fällen befasst.

1. Bezug auf den Patienten: Willenskraft und Selbstzucht; ernstes Wollen; Geduld und Heiterkeit; Intelligenz und Enthusiasmus und Interesse; soziale und finanzielle Stellung; Methoden der Behandlung und des Unterrichtes.

2. In Bezug auf den Arzt: Persönlichkeit; Willenskraft; Energie; die Fähigkeit zu lehren; Enthusiasmus; Detailarbeit.

THE TREATMENT OF TUBERCULOUS PATIENTS IN THEIR HOMES AND PLACES OTHER THAN SANATORIUMS.

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In the treatment of tuberculous patients in their homes the first and most important asset for the physician is the confidence of the patient and his family or friends. Without this the other greater vantage-point of discipline cannot be gained; and just as discipline makes the better soldier, so obedience to direction makes the better patient and counts unmistakably in the fight against the disease. The exercise of rigid discipline in the treatment of tuberculous patients in their homes is of the utmost moment, chiefly for the reason that we, as yet, have no specific for its cure, and every point in the patient's daily routine counts. It therefore follows that for those cases where discipline cannot and will not be followed at home, the sanatorium is by far the best place for them.

All patients, however, cannot take sanatorium treatment, for the reason that the prevalence of tuberculosis is great, whereas the number of sanatoriums is small. Again, personal choice, peculiarity of temperament, and individual necessity make it impracticable. Some patients do well under rigid sanatorium discipline, and are awed into submission by the wrecks which they see around them, or are encouraged to renewed efforts by the remarkable cures that they witness; others are depressed by homesickness, chafe under restraint, or become demoralized by the unfavorable cases which they must encounter where many are treated; others still would gladly go into an institution where their needs can be better looked after, but the stern hand of poverty holds them closely to the home, though it is often barren of comfort and its surroundings unsanitary.

Since the vast majority of tuberculous patients, for one reason or another, cannot take sanatorium treatment, it is of the utmost importance to know how to treat these cases in their homes. To be sure, the problems encountered in the home are much more varied and complex than in the sanatorium, for one has to deal with the sympathy and indulgence of parents and relatives, the interference of misguided but well-intentioned friends; family jars and discords; unsanitary surroundings; inadequately constructed houses; the

pinchings of poverty, and other unfavoring conditions too numerous to mention. In a great majority of cases these difficulties are not insuperable, and one need only study the splendid work that the dispensaries, district nurses, and day camps are accomplishing to see how order can, by a little effort, be brought out of chaos, even in the homes of the very poor.

The aim should be to direct your patient and his surroundings in the line of the best and most enlightened methods known in the treatment of tuberculosis, just as far as his means, and those which may be obtained by charity, will permit. Naturally, then, our consideration must take into account the home.

Location of the Home.

It should be located preferably on a hillside, and should have a background of trees to shelter it from prevailing winds. It should look to the south in this latitude; the soil should be porous, and the drainage good. The living floors should not be too near the ground; the windows should be large and numerous; and the porch room ample. In the vast majority of cases the home is a fixture and cannot easily be changed, though in the case of renters this can be and should be considered. This secured, the point of next importance is the selection of the room. For the invalid this should be the sunniest room in the house, the windows should be large, equipped with Venetian blinds or roller shades to protect from the heat and glare of the sun, and one at least should be cut down to the floor and open upon a porch on which the patient may remain during the day, and even during the night in appropriate cases. Indeed, a porch so located may, when equipped with Japanese shades, serve as the living-room of the patient, the room proper being used only for toilet purposes and in the most inclement weather.

The room of the tuberculous patient should be larger than that of the average invalid, allowing 2000 to 3000 cubic feet of air, which is frequently changed. Aside from its location in the home, it should be so constructed that cracks, crannies, and corners in and near the floor may be obliterated. Oil-cloth (or even cloth which may be painted) junctions between the walls and floors should be made. For the floor, paraffin or wax and paint may be employed to obliterate the crevices, at small cost. Where the floors are in too bad repair, a covering of oil-cloth, linoleum, wood-pulp, or other impermeable material may be employed. Carpets and heavy curtains should have no place in the sick-room. A few rugs which may be readily cleaned should be allowed; curtains are better dispensed with, but where employed, should be of smooth and light rather than shaggy and heavy material. Ordinary roller shades are useful and to be advised. Pictures on the walls brighten the sick-room and are not objectionable.

The room should be heated by hot water or steam. Open fireplaces are the equal of either, since they both ventilate and supply heat, but they are expensive. The lighting should be by electricity rather than by gas or lamps, since the two last mentioned vitiate the atmosphere by their combustion.

A toilet or bath should adjoin or be in close proximity to the sick-room, so that baths may be taken and the bodily necessities relieved without too great exertion to the patient.

In a still larger number of cases neither the location of the home nor the position of the room can be chosen. In such cases the best must be made of the situation as presented. It is imperative that the patient should have his own bed. Where poverty entails greater crowding than this, the patient should be sent to a hospital, by permission, if possible, of the Board of Health authorities, if necessary. The danger to the patient and his discomfort from crowding are not so much to be considered as his menace to those who must share his room and bed. He is, in consequence of his disease, a danger to the public, and should be handled by the public authorities if he will not listen to advice.

He should not only have a separate bed, but a separate room. Even in the poor the general equipment of the room should differ only in minor details from that already described. Filth need not be associated with poverty, though it, unfortunately, usually is. The carpet is commonly dispensed with through necessity, and rugs may often be better replaced by the morning newspaper, upon which a cuspidor partly filled with water is placed. The floor can be painted at a small cost, and room-cleanliness can be enforced by the physician if he will take the pains. Much furniture is undesirable in the sick-room. The bed should be placed alongside the window, and elevated if need be. When possible, the patient should be removed to the roof, to a veranda, or the yard in the daytime. He should be protected from excessive heat of the sun or inclemencies of the weather by some form of tent or the so-called half-tent, arranged after the fashion of the Sedan chair. Where neither yard-room nor porch space nor roof is available, but the patient must be confined to a single apartment, the window should be kept open night and day, and closed only long enough for him to attend to his bodily needs. At night some form of window tent may be employed and undue chilling of the room avoided. These may be obtained ready made at relatively small cost, or they may be improvised. In all types the object is to get the patients as far out into the fresh air as possible. For those in better circumstances a shack or tent in the yard may be substituted for these makeshifts. In all cases, whether rich or poor, several inflexible rules should be enforced, viz.:

1. All cases should be required to expectorate into vessels containing water, and when feasible they should contain some disinfectant. The kind

of receptacle matters little, except that the mouth of it should be large enough to catch the expectorated matter and so not let it get upon the floor; and it should be light enough for the patient to handle easily when confined to bed. If care is used, an old tomato-can may be made to serve quite as well as the most expensive cuspidor. If vessels of this character are not used, the patient should be required to expectorate into cheese-cloth or paper handkerchiefs which can be burned.

2. As many hours of the twenty-four as possible should be spent out of doors.

3. An abundance of wholesome food must be taken by the patient.

4. The patient should not be oppressed by too much clothing, but should always have sufficient to keep him warm. With some the fear of catching cold causes them to needlessly burden themselves with clothing. A hot-water bag to the feet will make the patient comfortable with less clothing.

5. As cheerful surroundings as possible must prevail, and freedom as far as possible from domestic and business cares obtain.

6. Constant medical supervision must always be exercised. This can be obtained now by all who wish and will take the trouble to get it.

The Dietetic and Hygienic Régime.

In tuberculosis the destructive processes are so great, and loss of appetite so constant a feature, that the matter of diet must be given special and skilled attention; and patients should be weighed each week in order to determine whether they are gaining or losing weight. Patients, as a rule, do best on solid food when they can take enough of it, but in all cases this should be supplemented in greater or less degree by milk and eggs. Fats are well borne by tuberculous patients and should be freely taken. The quantity of food taken should at least equal the amount consumed by the individual in health.

Any of the dietaries suggested by Cornet, Bardwell and Chapman, Fisher, Lucas, and others may be employed as given, or modified to suit the individual case. The following, suggested by Latham, is perhaps as good as any:

"In the system I follow three meals are given every day, and nothing is allowed between times. Breakfast at 8 A. M. consists of tea or coffee, a large quantity of butter and bread (not new), eggs, fish, meat, such as ham or tongue or sausage, or occasionally raw scraped meat or cured salmon, with a pint of milk. Dinner at 1 o'clock consists of two hot courses of meat, or sometimes one of fish and one of meat, about 4 to 6 ounces of each, with a large quantity of specially selected potatoes, containing an abundance of carbohydrate material, with fresh green vegetables or rice, and an abundance of excellent fat-containing sauces. The third course may be pastry, or some form of farinaceous pudding; on alternate days this may be replaced by

fruit, or ice-cream may be given. In addition, the patient has a pint of milk, and at the end of the meal may have a cup of coffee. Supper is at 7 P. M., and consists of one hot course of meat with potatoes and vegetables, and one cold course of meat or fowl, with an abundance of bread and butter and cheese, and a pint of milk. At the end of the meal a cup of tea is allowed if the patient wishes for it."

Individual choice or needs as to time of rising, temperature and kind of bath, hours for meals, kinds of food, and the amount of rest or exercise may cause modification of the following daily routine observed at Nordrach, but it is an excellent schedule, and may serve as a guide in the home quite as well as in any sanatorium:

"The patient is called at 7 in the morning, and in the colder months the windows of his room are then closed, in order that the room may be comfortably warm while he dresses. This shutting of the windows at this time serves another purpose, in that the air of the room immediately tends to become stuffy to those accustomed to open-air methods. Consequently there is a direct incentive to patients to get up. The patient then takes his temperature (rectal), and rises not later than 7.30, and then has a shower-bath at a temperature, in most cases, agreeable to himself. He must avoid overexertion in drying himself. On completion of his dressing he should open the windows. Breakfast is at 8 o'clock. Directly after breakfast, or at 8.30, the patient starts out for his morning walk, the length of which is graduated according to his condition. He walks deliberately, avoiding any strain, dyspnea, or perspiration, until he has arrived at his destination, and waits there, resting in the fresh air, but protected from the wind, until it is time for him to start home again. At 11.45 he must be in his own room, where the windows have shortly before been shut, and must take his temperature. In five or ten minutes he should open the windows. Between 12 and 1 o'clock he lies resting, and alone, at full length on a sofa-chair near the window. At 1 o'clock he leaves his bedroom or shelter and has luncheon, the principal meal of the day, with his family. Not later than 2.45 he must start on his slow afternoon walk, which is the shorter walk of the day. He rests, as before, when he arrives at his destination, and slowly returns, so that he reaches home at 5.30, or, if it is very cold, at about 4.45. He again takes his temperature, opens the windows, which have been closed shortly before his return, and rests alone until dinner-time. At 7 o'clock he joins his family at dinner. After dinner he may spend half an hour to an hour in the dining-room, or preferably in some suitable recreation room, under open-air conditions. The patient retires to his own room at 9 o'clock, opens the windows, and takes his temperature. He should be in bed at 9.30, or at latest 10 o'clock."

Debility.

Malnutrition, loss of weight, and debility are common symptoms attendant upon tuberculosis. These are best combatted by the measures already suggested. Their efficiency may be augmented by the proper employment of tonics. The drug treatment of the debility of tuberculosis does not differ

materially from that resulting from other chronic disease. If the appetite is poor, combinations of gentian and cinchona and nux vomica will improve it in a large percentage of cases; or alcohol in some form before or at meals may be given.

The nervous debility and impoverished blood condition are best met by the administration of strychnin, arsenic, and iron.

Alcohol.—As to the question of alcohol, care should be exercised not to allow the subject to become addicted to its use, but its value as a stimulator of the appetite and as a protector of the tissues by its immediate oxidation is doubted only by a few. Many who oppose it because some abuse its use often resort to other stimulation or excesses. I once knew a minister who considered it a sin to take a glass of wine or spirits or anything alcoholic, and he was violent in his denunciation of those who did, but I saw him drink six cups of strong tea before he would go into the pulpit to preach his sermon. Such instances could be multiplied if necessary.

If the average normal man at times feels the need of stimulation, then why not the one who is depleted by disease? It has been employed since the dawn of history, and because we encounter an occasional Noah, that is no reason for our prohibiting a blessing and a remedial agent of so great value. On this subject Latham makes the following temperate observations:

"Experience has shown that alcohol is of the greatest possible service when fever is present. It saves the body proteid, stimulates the appetite, and, in small doses, hastens gastric digestion. It facilitates the absorption of fat, and tends slightly to lower the body-temperature. In addition, it stimulates the heart and central nervous system, and favorably affects the night-sweats and the sleeplessness. When solid food cannot be taken, alcohol is our sheet-anchor."

Of the medicines which have in times past been recommended as more or less specific in their cure of tuberculosis, I shall not weary you even with their mention. Such remedial action as seemed to follow the use of many of them appears, in the light of our present knowledge, to have been the result of an improvement in the digestion and nutrition of the patient rather than of any specific action of the drug. From this standpoint some of them may still be used and are being employed. Of the class referred to I may mention only a few: cod-liver oil, olive oil, and various other oils—all fats; creasote and its compounds; iodin and its compounds; mercury and its compounds, etc. Of the whole list, all have been abandoned as specifics, with the exception of mercury, which is now receiving renewed attention and is being strongly advocated by some. Its claims will have to be established by a much wider application and verification before the drug can be accepted as a specific for tuberculosis. My own experience is not sufficient for me to make any statement concerning its value. The truth of the matter is,

much to our disappointment and much to the misfortune of the race, we have as yet no specific for the cure of tuberculosis, and our hopes of stamping out the disease now rest almost entirely on the hygienic and dietetic régime already presented.

The Serum Treatment.—Reasoning from analogy, the sera for the cure of diphtheria, rabies, tetanus, meningitis, etc., lead us to believe that ultimately a serum will be obtained which will be specific in the cure of tuberculosis, but at the present time we have in all the sera that have been employed, only an approximation to what will surely be realized. It is a little singular that the first serum to be discovered still stands at the head of the list; it and the tubercle bacillus will for all time stand as monuments to their brilliant discoverer and humanity's benefactor, Robert Koch.

Time will not admit a description of the various sera for the cure of tuberculosis, all of which have been thoroughly tested. It can only be said in passing that Koch's original tuberculin under more careful administration seems to be yielding excellent results in the hands of some experienced observers, but at the present time it is not sufficiently perfected, or the dosage not well enough understood, for it to be indiscriminately recommended for use in inexperienced hands.

Treatment of Symptoms.

Fever.—Rise of temperature, usually occurring with more or less regularity in the afternoon or evening, is frequently the first evidence of tuberculosis. The patient's appetite is poor, he is losing flesh and strength, and has for days, perhaps weeks or months, been "feeling bad." This may be condensed in time and produced in miniature by the injection of tuberculin—the miniature phase disappearing when too much tuberculin has been administered. Clinical experience furnishes this axiom: "A daily rise of temperature without other assignable cause, and extending over a considerable period of time, is presumptive evidence of tuberculosis." Fever is, in a sense, a measure of the activity of the tubercular process. The temporary reduction of temperature does not mean that the process is checked, but the continuous control of the febrile excursions implies that we have the situation in hand. For the control of the temperature we have at our disposal the employment of rest, hydrotherapy, dietetic regulation, and medicines.

First in importance is *rest.* Bodily energy is produced by metabolism, *i. e.*, work on the part of the tissues; excessive work produces excess of heat. This is dissipated normally by radiation from the skin and sweating; by the urine, and in small part by the feces; and by the lungs in respiration—all of which processes are regulated and act under control of the nervous system. Pathologically, the toxemia produced by the tubercular process

interferes with the nervous regulation of metabolism and the control of bodily temperature. Clinically one finds that in some cases of tuberculosis even a little exercise produces an unpleasant rise of temperature. Rest in bed or a reclining chair for a few days brings the temperature back to the normal, and it remains so until too much exercise is again taken. This result follows so certainly in a large number of cases that we are justified in regarding rest as a first means of controlling fever in the tuberculous. It is not possible to lay down hard-and-fast rules as to when and how much exercise should be taken. Generally speaking, when the temperature has been normal for a week, the patient may be allowed to exercise in moderation. The patient should here be closely watched, and if the exercise be followed by exhaustion or a rise of temperature, less arduous exercise must be taken after the temperature has again reached the normal. The best and most generally employed exercise at the outset is walking and grade climbing. As the patient improves, the exercise prescribed may be increased until he can do an ordinary day's work without undue fatigue or rise of temperature. In all cases where exercise is permissible the rule should be, "stop short of fatigue."

The grade exercises prescribed by Paterson are excellent and within the reach of all. (They may, of course, be modified as circumstances warrant.)

1. Slow walking exercise, beginning at 2 miles a day and gradually increasing up to 10 miles a day.
2. Picking up fir cones and firewood in the grounds and carrying a half basket (weight, 11 pounds) to the stack.
3. Carrying a full basket of firewood and cones (weight, 16 pounds).
4. Carrying a half basket of gravel or stones from the gravel-pit to the place where paths are being made or repaired (weight, 21 pounds).
5. Carrying a basket of gravel or stones the weight of which is gradually increased up to 38 pounds.
6. Rolling the grass or gravel (16 men pull a roller weighing 15 hundredweight).
7. Digging ground already broken.
8. Moving with lawn-mower.
9. Digging unbroken ground.
10. Same as 9, but for six hours daily instead of four.

Second: Sometimes the temperature rise is produced by gastro-intestinal disturbances. Attention should therefore be paid to the condition of the alimentary tract and the dietetic régime. It has been observed that in many cases the temperature will become normal as soon as the patient can be gotten on a solid diet.

Third: *Hydrotherapy.* When rest and regulation of the digestion do not avail, resort may be had to sponging and baths. A hot foot-bath with or without mustard will frequently tranquilize the nervous system of the

patient, reduce the temperature, and give the patient a refreshing night of sleep. When this fails, resort may be had to sponging the body with tepid water, cold water, or water to which alcohol, cologne, or vinegar has been added

Fourth: *Medicines.* These should be employed with caution, and only when other measures have failed, since nearly all of the class of antipyretics are depressing in their effects. Quinin is perhaps most generally employed, often is effective, and usually is least objectionable. Salicylate of sodium and asparin are also of value. Rarely phenacetin, antipyrin, or pyramidon may have to be used. Of the last class, Koch regards pyramidon as least depressing and of greatest efficiency.

The Cough is nature's effort to rid the bronchial tract of an irritant. It is, therefore, on occasion, not only not objectionable, but, on the contrary, beneficial. When the cough is simply irritative and ineffectual, it should be suppressed; when it is productive, resulting in freeing the tubes of mucus and detritus, it should be encouraged. Many cases of pulmonary tuberculosis have an accompanying bronchitis; the secretion resulting therefrom tends to occlude the tubes, obstructing the breathing processes, impairing nutrition, and interfering with a proper aëration of the blood. Any remedy which will assist in freeing the tubes of the mucus-accumulation, and at the same time not interfere with the patient's digestion, should be employed.

Often in these cases the cough is irritative, or nervous, or due to terminal stimulation of the vagus by a disordered digestion. In such, the patient should be taught to suppress the cough. It is remarkable how much this may be done by an effort of the will, and that it is feasible is shown by the small amount of such coughing to be heard in any well-regulated tuberculosis sanatorium. When coughing is excited by exercise or talking or smoking, these should be abated. If it is produced by an irritation of the epiglottis or larynx, these organs should be treated by local applications (lozenges, gargles, and sprays). The same is true of the usually accompanying pharyngitis, which produces an excessive secretion of mucus and acts as an irritant to the epiglottis and larynx.

In all cases where there is more or less inflammation of the pharynx, larynx, and upper trachea, I have found an inhalation or spray more effective than cough mixtures. I have not found anything to surpass for this purpose the Beverly Robinson inhaler. This consists of a perforated zinc mask covering the mouth and nose, and held in place by elastics which go around the ears. In the inside of the mask is a sponge and upon it is placed a few drops of the following mixture:

℞. Menthol ..... gr. xx
Alcohol or spts. camphor
Chloroform
Creasote (beechwood) ..... āā ℥iiss.
M. Sig.—Use in an inhaler for fifteen minutes p. r. n.

The above mixture may be used several times a day for ten or fifteen minutes, and without the creasote if that drug is repugnant to the patient.

For the pharyngeal and nasal catarrh usually present I have found a spray of the following ingredients very grateful:

℞. Menthol.....gr. xx
Camphor.....gr. v
Carbolic acid.....gtt. vj
Liquid albolene.....℥ij.
M. Sig.—Use in atomizer as directed.

It will be seen, therefore, that there are many causes of cough, and for its relief in each individual case we should discover what is producing it.

In the average tuberculous case the cough which occurs on waking in the morning is the result of the mucus-accumulation in the tubes during the sleeping hours. It is nearly always productive, resulting in the bringing up of more or less mucus, and should not be suppressed. Aside from this, the cough that may be suppressed at will, the cough produced by extrabronchial reflex irritation, there still remains the cough produced by the chronic bronchitis which may be regarded as almost a part of the disease.

Iodin in some form has long been our sheet-anchor in the treatment of chronic bronchitis, and often gives gratifying results in tuberculosis. The great drawback to its employment is its liability to upset the stomach. Usually iodid of potassium or sodium is given in 5 to 10 gr. doses t. i. d.

The nauseating expectorants, antimony, ipecac, senega, squills, may be employed in exceptional cases, but for the most part should be dispensed with.

The stimulating expectorants need frequently to be employed. Of them, I prefer aromatic spirits of ammonia, muriate of ammonia, carbonate of ammonia, or carbonate of potassium. Any of these may be combined with glycerin and opium in some form. The following mixture has proved very effective in my hands, and I have rarely found a patient who could not take it:

℞. Heroin.....gr. j–gr. ij (or codein, gr. iij)
Spts. ammon. arom.....℥ss
Glycerin.....℥j–℥ij
Ess. pepsin.....℥iij.
M. Sig.—Dose ℥j in water every three hours.

Chloroform, gtt. iij to v to the dose, may be given along with the above to advantage in appropriate cases.

Opium in some form is our main dependence for the relief of the cough. Heroin, gr. $\frac{1}{24}$ to gr. $\frac{1}{12}$; codein, gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$; morphin, gr. $\frac{1}{32}$ to $\frac{1}{16}$ to $\frac{1}{8}$; paregoric, gtt. xxx to lx; tr. opii, gtt. x to xv—all may be employed plain or in combination with some of the above-mentioned drugs.

Sometimes the cough is so incessant and exhausting that a hypodermic

of morphin, gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$, may be necessary. When the tubes are much occluded by mucus-accumulation, ipecac or apomorphin may occasionally be employed to free them.

When the expectoration is profuse, creasote in 1- to 3-minim doses, or carbonate of guaiacol, gr. v, may be given t. i. d.

Night-sweats.—The night-sweats which are so disagreeable and exhausting, often being so great as to necessitate change of the patient's body- and bed-clothing several times a night, seem best relieved by absolute rest in bed, an abundance of fresh air, and wholesome food. If this régime is carried out faithfully, the results will be found to be most gratifying. External applications are employed, but for the most part they are employed after the first sweat is over. At this stage a brisk rubbing with alcohol or vinegar and water is grateful. It wakes up the sluggish circulation, and this, with the massage, doubtless operates to keep off the next sweat. The sweat is sometimes the expression of exhaustion. In these cases a cup of hot milk on going to bed or on waking will ward off its occurrence. When these remedial agents fail, resort may be had to drugs. These are for the most part makeshifts, simply adding to the comfort of the patient without in any way attacking the cause. The night-sweat is the constitutional expression of a septic condition; as would be expected, little can be promised for the relief of this symptom in the employment of drugs to check the sweat; it must come from general care, already outlined. Atropin, gr. $\frac{1}{200}$ to gr. $\frac{1}{100}$ at bedtime, repeated in three hours if necessary, gives perhaps the most satisfactory results as regards the sweat, but it diminishes all glandular secretion as well. It often produces an unpleasant dryness of the mouth and increases the cough. Aromatic sulphuric acid, gtt. xxx in water t. i. d., or agaricin, gr. $\frac{1}{10}$ t. i. d., are also employed, and in some cases with apparent effect.

Hemoptysis.—Hemoptysis occurs in a comparatively large percentage of cases, depending upon the stage of the disease and the nature of the tuberculous process. It is one of the most difficult symptoms for the physician to control, and one which, almost without exception, produces terror in the patient and consternation to his family and friends. Immediately upon the appearance of hemoptysis the patient should be put to bed and made to remain there until the sputum has been free of blood for several days, the degree of rest enforced depending upon the nature of the hemorrhage. In moderate bronchial hemorrhage and that resulting from erosion of a small vessel or vessels, the rest enjoined is less rigid than that resulting from the breaking of a large vessel or the rupture of an aneurismal sac. When the hemorrhage is excessive, not only absolute rest is imperative, but the patient must be kept from raising his head from the pillow, talking, etc.; elevation of the foot of the bed, ligation of the extremities, and hypo-

dermoclysis may be necessary. Since it is often impossible to tell the size of the vessel which has broken, it is well to err on the side of prudence and enjoin too great quiet, rather than too little. Coughing should be suppressed as much as possible, and liquid food taken, as solid particles of food may irritate the larynx and produce violent fits of coughing.

Drugs.—Immediately on the appearance of hemoptysis a hypodermic of morphin, gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$, with atropin, gr. $\frac{1}{100}$, should be administered, as it diminishes the cough and quiets the patient, the only objection urged against this being that you may cause the patient to drown in his own blood. The objection is theoretical rather than practical, as in such severe cases the morphin generally retards but does not entirely check either the cough or the hemorrhage; but in these cases the retardation process is sufficient to bring greater rest to the bronchial tract, and leave sufficient blood at the seat of the hemorrhage to facilitate the formation of a clot by pressure. If the hemorrhage is sufficient to contraindicate the employment of the morphin, from fear of suffocating the patient, I believe that without it the patient would die any way, and more quickly from hemorrhage.

Babcock and others have urged the hypodermic administration of large doses of atropin, but I have not been persuaded that it in any way equals morphin. Ergot, tannic acid, gallic acid, etc., have been recommended, but I believe they do more harm than good.

Theoretically, agents which increase the coagulability of the blood have been advocated. The more important of these are calcium chlorid and gelatin. More recently suprarenal extract has been highly recommended. It may be difficult to satisfactorily explain its value in hemoptysis, but clinically it has yielded good results in my hands, and I always employ it in connection with morphin. When the hemorrhage is on, I always give a hypodermic of calcium chlorid, and continue its use either hypodermically or by mouth, every four to six hours, until the sputum is comparatively free from blood. The other symptoms, of dyspnea, tachycardia, insomnia, headache, etc., must be treated symptomatically as they arise.

Conclusions.

I. It must be borne in mind that in the vast majority of cases the fight against tuberculosis must be waged in the home.

II. In a large number of cases the results are just as good as, and in some even better than, in sanatoriums, if sanatorium methods, so called, are enforced. Where these cannot obtain, the sanatorium is a necessity.

III. Finally, for ultimate success, we must depend upon the intelligent and faithful work of the general practitioner.

ECONOMIC HOUSING OF CONSUMPTIVES, WITH ESPECIAL REFERENCE TO THE SOUTHWEST.

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Introductory.

When one considers the appalling number of consumptives in these United States, and the meager arrangements for their care, one is naturally led to consider ways and means whereby, with the limited appropriations available, provision may be made for a greater number. The cost of housing consumptives, according to usual methods, is more frequently above than below one thousand dollars per individual. Expensive buildings of brick and stone are not only unnecessary, but actually less effective than cheaper structures, and it is proposed in this article to advocate the construction of sanatoriums with less regard to architectural beauty than to economy.

The Crowding of the Cities of the Southwest with Consumptive Visitors.

By reason of the fame which has been acquired by the climate of the arid southwest in the effective treatment of tuberculosis, great numbers of persons afflicted with this disease resort to the cities, towns, and even the country districts of Colorado, New Mexico, Arizona, and southern California. While tuberculosis is no respecter of persons, attacking the rich and the poor alike, I believe that it is an unquestioned fact that a majority of persons attacked by tuberculosis are of moderate, or very needy circumstances. It has, therefore, become a problem of serious import to the residents of the southwest to make proper provision for the care of indigent consumptives. I have found it impossible to obtain data regarding the number of consumptives and the percentage of indigent among them who resort to the southwest in general, but in the town of Deming, with a population of only 1500 (census of 1900, and a present estimated population of 2500), the chairman of the village board of trustees estimates that 250 consumptives resort to the town annually. About 10 per cent. of these are indigent and 5 per cent. become public charges. There is no institution in the town where they may be cared for. Most of them find homes in boarding-houses, rent cottages, or camp out in very primitive fashion.

Fig. 1.—Fort Stanton, New Mexico. Early tents.

Fig. 2.—Our latest model tent. Front view.

The mayor of Las Vegas, a town of about 5000 people, estimates that 250 consumptives come to his town annually, and that at least 50 per cent. of them are indigent. There are ample accommodations, but the expense of their care is a heavy burden on so small a town.

Dr. Charles T. Race, sanitary inspector in the health department of the city of El Paso, Texas,—a city with a population of 40,000,—informs me that the city has about 1500 consumptive visitors. More than 500 of these have insufficient means, 250 receive partial support, and 150 are wholly destitute. There are no free tuberculosis hospitals, and the destitute are sent to the county hospital. A prominent clergyman of El Paso informs me that fully 60 per cent. of all requests for assistance come from consumptives, and that three-fourths of these are indigent.

Letters of inquiry were addressed to a number of other towns, but statistics seem to be unavailable; but if the figures relating to Deming, Las Vegas, and El Paso may be taken as at all representative of the towns of the southwest, it will readily be seen that the problem of caring for visiting consumptives must be one of great magnitude. It may be remarked *en passant* that a considerable percentage of the active professional and business men of El Paso first came there as health-seekers, and after recovery have established themselves in the town.

In the beginning there was great difficulty in convincing the people of the communicability of tuberculosis. This led perhaps to too great insistence upon this feature of the disease; as a consequence, there has developed a very decided phthisiophobia, which has produced a condition of affairs in the southwest which is utterly deplorable, and it is now extremely difficult for avowed consumptives to secure accommodations in the hotels and boarding-houses in the southwestern cities. This condition of affairs has naturally led to public effort looking to the establishment of special institutions in which tuberculous visitors may be received and cared for. I myself came to the southwest as what is locally known as a "health-seeker," and I can but feel a warm sympathy for my fellow-consumptives seeking climatic relief, who now arrive in the towns of the southwest and, applying for lodgings, find the much too familiar sign, "No consumptives taken." I, fortunately, came to the southwest in the line of duty, and while still sick took command of the Fort Stanton Sanatorium, where in less than nine months I made a complete recovery, and have remained well for nearly seven years; but my sympathy will always go out to those poor victims of tuberculosis who come to the southwest with barely sufficient funds to reach their destination, in the hope of finding "light employment" which will maintain them while a beneficent and heaven-given climate effects a cure. We need now, in our efforts to teach the people about tuberculosis, to emphasize the fact that while the ignorant, careless, or vicious consumptive *is*

dangerous, the educated, careful, and conscientious consumptive is not a menace to the health of his associates.

The Problem of Housing Consumptive Visitors as the Southwest is Trying to Solve it.

Almost every city of any size in the southwest has one or more sanatoriums devoted especially to the treatment of tuberculosis (mostly conducted for profit), and the cost of construction of the various sanatoriums within my knowledge varies between very wide limits. For instance, the Albert Baldwin Sanatorium at El Paso, Texas, a beautiful stone structure, cost, furnished, $115,000, and accommodates 50 people—more than $2000 per capita; while the Association Health Farm, conducted by the Young Men's Christian Association at Edgewater, Colorado, and accommodating 58 men, represents a value of about $50,000—nearly $1000 per capita. One sanatorium in Alamogordo, New Mexico, cost for buildings only $40,000, with $5000 for furnishing, and has a capacity for 75 patients, or $600 per capita only. At Fort Stanton, New Mexico, beginning with a collection of stone and adobe buildings constructed for the use of the army, we have spent about $250,000 to care for 250 to 300 patients. This expenditure includes the remodeling of the old buildings and the construction of nearly 100 tents and tent houses, and the plant as it stands is worth all of a half million dollars, exclusive of site. It should be here stated that Fort Stanton has its own ice, cold storage, and electric-light plants, steam laundry, water and sewer systems, etc., and that the present executive and service buildings, officers' quarters, etc., would still be sufficient even though the capacity of the sanatorium were increased 50 to 75 per cent. by the construction of additional tent houses, and such an increase would add but little to expenditures for salaries of officers and employees. In El Paso, Texas, cited above as illustrative of how consumptives are crowding into the southwest, the situation has become so acute as to enlist the sympathy and effort of the charitably disposed citizens of that town, and there is now on foot a movement to establish, a few miles out of town, a tent city for the accommodation of consumptives in general and indigent consumptives in particular.

At Roswell, Santa Fé, and many other towns in New Mexico, as well as in Arizona and Colorado, similar tent colonies are being established. Some of these have their distinctive tent dwellings, usually accommodating one or two patients each, costing from $85 to $150 per bed unfurnished, but not including administration and service buildings. Two interesting specimens of this class of sanatoriums are shown in photographs of the New Mexico Cottage Sanatorium, at Silver City, where the total cost per bed furnished is about $800, and the Nordrach Ranch Sanatorium, at Colorado Springs, Colorado, where the cost per bed is about $700.

Fig. 3.—Our latest model tent. Rear view.

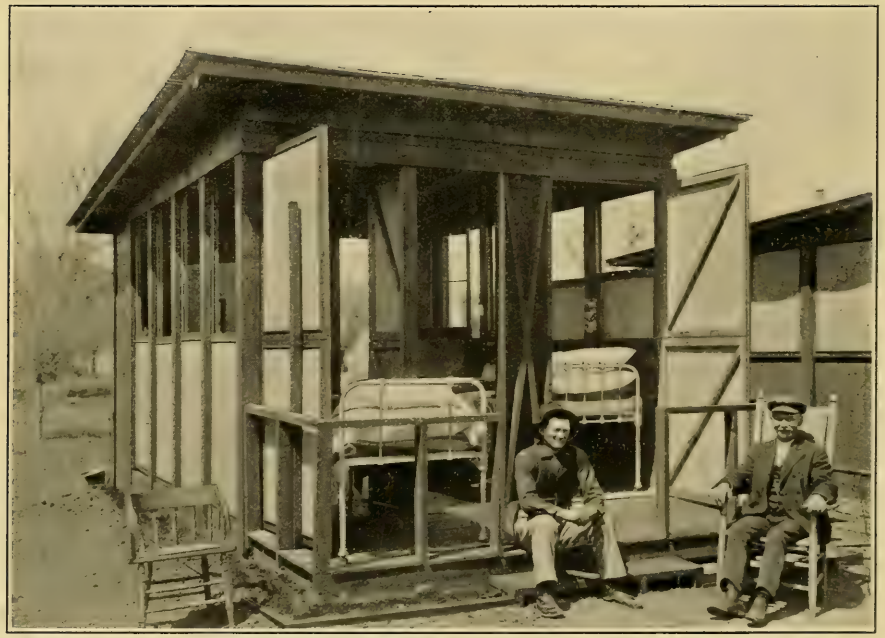


Fig. 4.—Fort Stanton, New Mexico, tent house.

History of the Tent as a Consumptive Dwelling as Developed at Fort Stanton Sanatorium.

About seven years ago I first began to use tents, pitching four or five of them in the shade of the cotton-wood trees near the hospital. They were very primitive affairs, and are illustrated in this photograph (Fig. 1). Each was simply a 12 by 14 tent, provided with two hospital beds with three 12-inch boards laid on the ground between the beds. Later we added a complete floor with sides running up two feet. Even these crude tents became very popular, and we gradually began to take more care in their construction. Our present tent, which is shown in the second photograph (Figs. 2 and 3), is 14 feet square, has a flooring of matched Texas pine, siding about 4 feet high, with a board shelf on each side as a convenient place for keeping various articles. It is supplied with a Dutch door in front and a glazed sash in the rear. The canvas sides are raised and lowered by a series of ropes and pulleys. This tent is heated by a small sheet-iron stove and accommodates two patients. The minimum standard of ventilation required is maintained by keeping the entire front and rear window open and by raising at least one of the side flaps. In case of rain or wind that side of the tent to the windward is permitted to be closed. On one occasion, being somewhat crowded and at the moment without additional tents, Mr. Thomas, our architect, and myself devised the structure, a photograph of which is now shown you and which we call a tent house (Fig. 4).

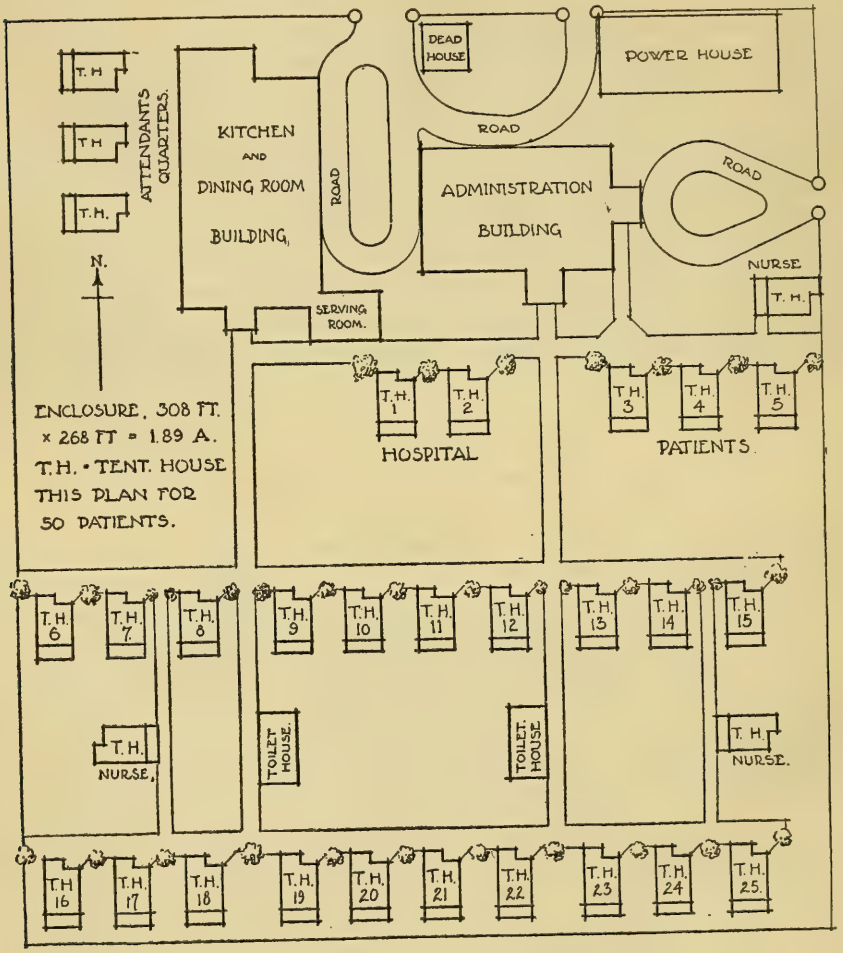
Each tent house is 14 by 14 feet and is intended for two patients. The ceiling is about 9 feet high, the sides being closed for half the distance up and the remaining portion covered with sliding canvas sash, provided with cords and weights, as are ordinary glazed sashes. The rear is boarded to the roof, and has a door opening on a porch and a connecting clothes-closet. The door contains a glazed sash which furnishes light when the tent house is closed. The stove is also placed near this rear wall.

The front wall contains three canvas-covered Dutch doors, two of which are wide enough to allow the beds to be rolled through. There is also a rear porch, not shown in the photograph, built in the same manner as the front porch. The roof has an ample overhang and a good slant. The slant should always be in the direction of the inclination of the surface of the ground, so that water from it will drain off readily. The ventilation is good, and the tent house will be open so much of the time that there is probably no objection to a small sheet-iron stove as a means of heating, it being both cheap and efficient. But one of the Franklin stoves, of which many varieties are sold, would be more cheerful, and assist in the ventilation, and such a stove is recommended. A lavatory with running water would also be very desirable, if such a convenience be practicable.

A tent house can be easily screened against flies, etc., it not being neces-

sary to make individual screens for window openings, but simply to cover them with wire cloth from a roll of proper width, securing it with battens screwed on. Of course, the doors will require separate screens, with frame.

A feature especially to be noted is the small ventilator in the roof. There



are a good many kinds of such ventilators, all serving to convert a horizontal current of air on the outside of the buildings into a vertical current in the inside. The "Star" is in use at the Fort Stanton Sanatorium and is very efficient.

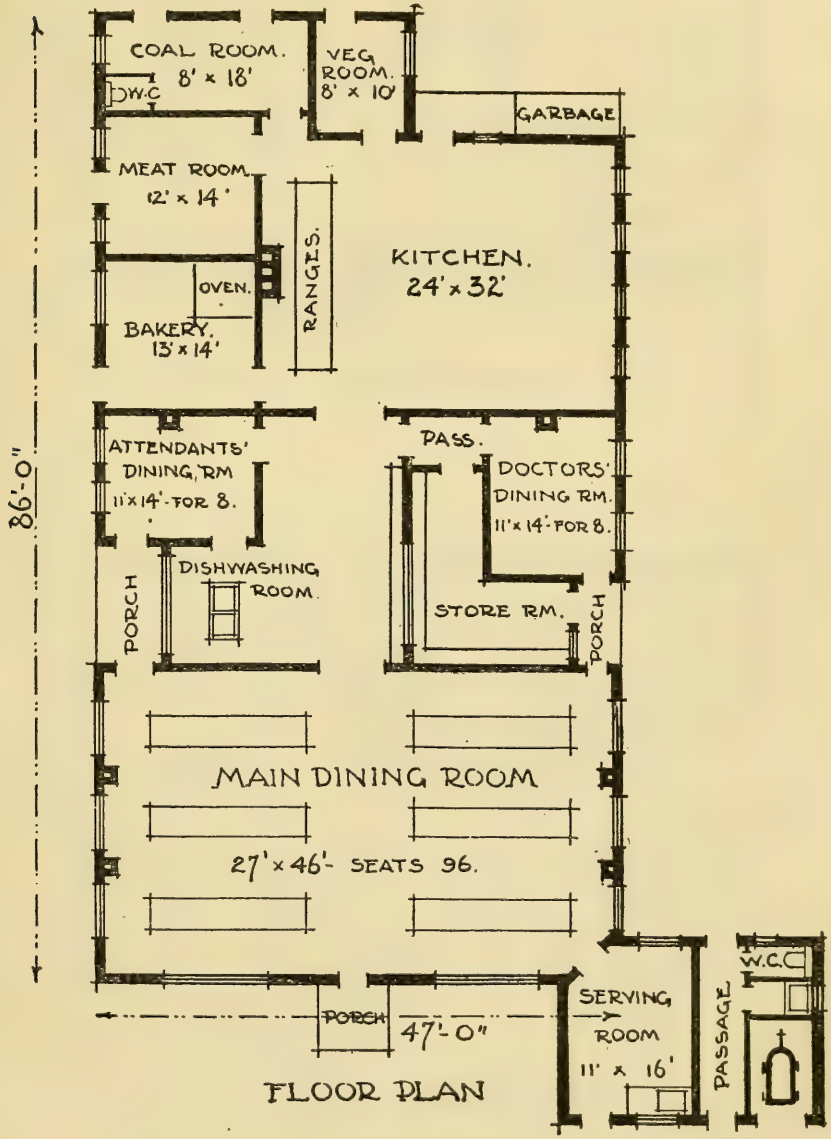
Fig. 6.—New Mexico Cottage Sanatorium.

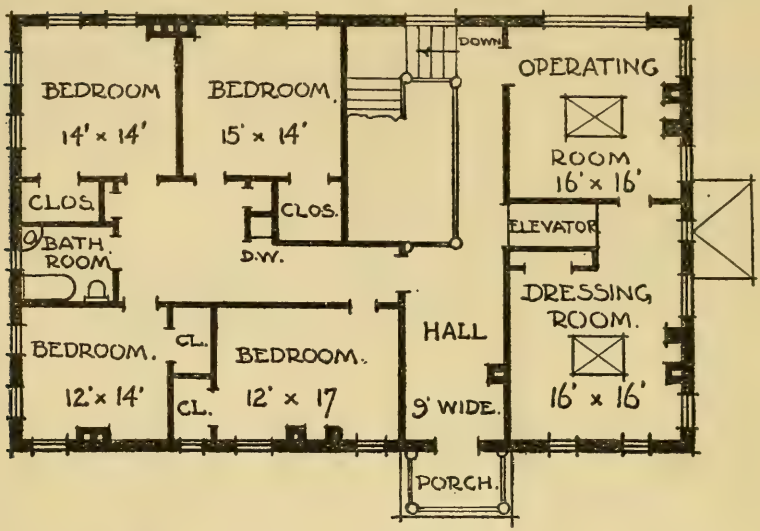
Fig. 5.—Fort Stanton, New Mexico. The intermediate development of the tent.

Fig. 7.—Tent house beautified by flowers.

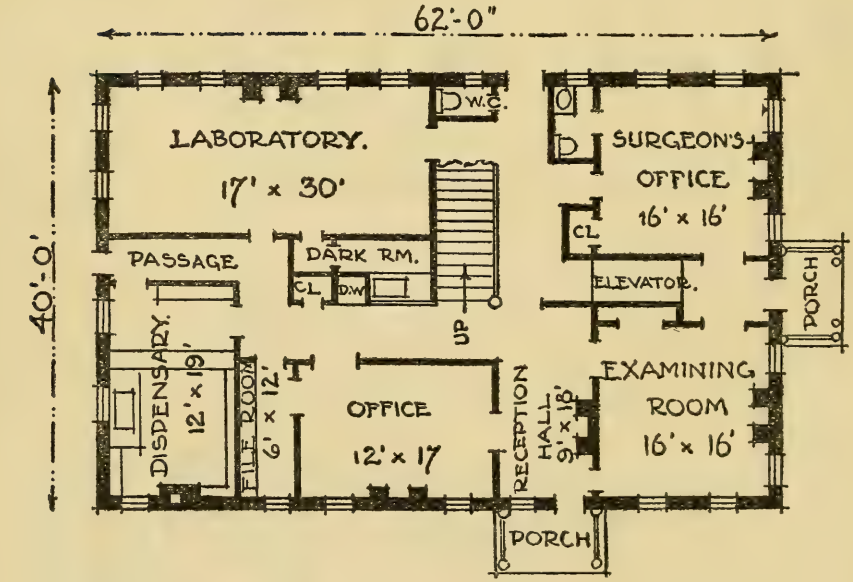
SOME OF THE ADVANTAGES OF A SANATORIUM COMPOSED OF TENTS AND TENT HOUSES GROUPED ABOUT A GENERAL SERVICE BUILDING.

Last year our architect, Mr. J. Ross Thomas, and myself published "An Economical Plan for a Consumptive Sanatorium," floor plans of which are published herewith. Of course, the cost of constructing buildings varies





SECOND FLOOR PLAN.

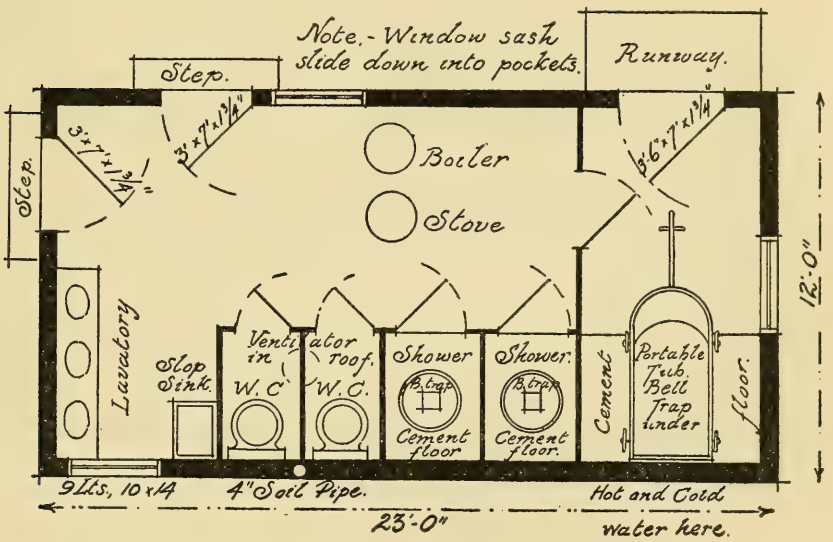


FIRST FLOOR PLAN.

greatly in different localities, but our tent house accommodating two patients has been built at Fort Stanton (an extraordinarily dear market) at a cost varying from $185 to $225, and under this plan I believe that a sanatorium for 50 patients, with all necessary service buildings, can be constructed at a cost of about $750 per bed, and upon increasing its capacity to 100 or 150, the cost of construction would be reduced to about $500 or less per bed. The use of some tents would further diminish the cost per bed.

Convenience of Grouping.—The plan permits a ready classification of cases in groups.

Flexibility.—Other groups of tent houses may be added as the sanatorium expands without necessarily adding to service buildings.



Isolation.—There is a distinct advantage in permitting patients who are personally agreeable to one another to live together. In large dormitories one disagreeable or offensive patient may render all the occupants uncomfortable, and there cannot be that degree of privacy which obtains in the tent house. In my experience at Fort Stanton patients invariably prefer the tent or tent house to the dormitory. They take more interest in its care, and I show in the accompanying photograph (Fig. 7) the possibilities of adornment in the way of flower culture. The tent house patient looks upon his quarters as his individual home, and the home idea develops, to the satisfaction and profit of all.

First Cost.—It often happens that those contemplating the inauguration of a sanatorium are in the outset cramped for money, and find it difficult to

start an enterprise which, once on the move, and showing results, would receive ample public support. With the plan submitted here, after having erected and equipped the kitchen and dining-room building, the construction of the rest of the hospital can be accomplished as necessity arises. For instance, the first floor of the administration building could be first erected and the second floor afterward. Then the power-house, dead-house, and other buildings, according to the exigencies of the various stages of development of the institution. Separate quarters for the surgeon and his family, amusement halls, band stands, and other desirable but not absolutely essential features can be added as its resources grow.

The small fire risk, both to patients and to buildings, due to the spaces separating the latter, is also a desideratum to be considered.

It has been objected by some that our tent house would be uncomfortably cold in some altitudes, but at Fort Stanton we have experienced temperatures as low as 15° F. below zero, and at no time have the occupants of either tents or tent houses experienced any discomfort.

Concluding, I will say that while most of the towns of the southwest have some sort of provision for caring for tuberculous visitors, very few have made adequate provision, and the several States and territories none at all. Private charity in several localities is beginning to discuss the problem, but these projects are of necessity slow, and nearly all the sanatoriums now conducted in the southwest are pay institutions; in the mean time, and until private and public charity have had time to provide sanatoriums for the indigent consumptives, our brethren of the east should be slow to advise their patients to resort to the southwest, unless such patients have sufficient means to defray their own expenses without the necessity of seeking employment.

DISCUSSION.

Mr. Van Pelt (New York): Realizing the danger of pauperizing the poor, experiments have been tried by Dr. Biggs, the medical director of the Board of Health of New York city, in the construction of shacks and courts for the New York Municipal Sanatorium of Otisville, New York. At other sanatoriums the usual cost of construction seems to be about $500 per bed, and this does not include the cost of administration buildings. The first shacks at Otisville cost in the neighborhood of this sum, but were considered unnecessarily expensive. Therefore a type of large shacks were built besides the sleeping space and veranda containing toilets, beds, lockers, and small cellar, with a heating plant, at a cost of about $220 or $230 per bed. After this a cottage plan without toilets was tried, at the cost of less than $150 per bed, and lastly a cheap but attractive large-type shack without toilets has been built at the cost of about $60 per bed. The cost of the

administration buildings per capita is from $100 to $150 per capita, so that the buildings for those patients housed in the cheaper shacks costs, exclusive of land, not more than $60 per capita.

Dr. McCoy (New Mexico) emphasized the necessity of keeping patients who were indigent away from the southwest. It is very hard to obtain employment; six men are waiting for every job in New Mexico.

Dr. Collins (Denver) remarked that the conditions in regard to work are the same there as in New Mexico. He feels that there is valid objection to tents, first in the difficulty in heating them without steam radiation, and second in the difficulty in cooling them in summer. Moreover, it is hard to administer tents for individuals. He thinks properly heated permanent but plain buildings, costing $700 or $800 per bed, are cheaper than erecting tents which require considerable repairs on account of the winds.

Dr. Carrington, in closing, remarked that they have no destructive winds in New Mexico, for their sanatorium is protected by hills. In spite of the high prices paid for the materials and labor, tents can be erected for less than $90 per bed, exclusive of the furnishings. They have found no difficulty in heating the tents, which is done by using a newspaper in an "air-tight stove." He said, however, that they have been determined in the use of tents largely by the fact that funds have only been available for temporary structures.

Dr. Minor, in closing, said that he did not wish to give up any element of treatment. For treatment at home, personality and magnetism were necessary. The difficult problem was the affectionate friend or mother, and the freedom from interfering relatives was one of the advantages of the sanatorium. In the negro the results were worse, because of his constitutional lack of resistance to the disease and the difficulty of teaching him hygiene. In his experience negroes were fond of late hours and dissipation. He recommended class work along the lines of Dr. Pratt, of Boston, in solving the problem of their treatment. He said that he employed hygiene, tuberculin, and discipline, but that the most important element was personal supervision by the doctor.

SANATORIUMS FOR THE WELL-TO-DO.

By Charles Fox Gardiner, M.D., and William H. Swan, M.D., and Herbert Maxon King, M.D.,

Cragmoor Sanatorium Colorado Springs, Colorado; Loomis Sanatorium, Liberty, New York.

What are the Essential Differences Between the Requirements of the Tuberculous Well-to-do and Those of the Very Poor?

The principles involved in the treatment of tuberculosis are, of course, the same whether the patient be rich or poor—replacing an unhygienic environment by one that is hygienic; substituting a normal and properly constructed diet for an insufficient or an unsuitable one; instituting a careful régime as to rest and exercise, and, in short, placing the patient under such conditions as shall in greatest measure tend to build up his individual constitution and promote his resistance to disease, constitute the principles of treatment. It has been demonstrated that these principles are easier of attainment and can be more readily and effectively applied in a sanatorium constructed and equipped for the purpose than elsewhere. If this is a fact,—and we believe it is, notwithstanding a reactionary sentiment which has found expression in some recent medical literature,—there is quite the same degree of necessity for the establishment of institutions of this character for the well-to-do as for the poor.

In the case of the poor, we may suppose the diet to have been insufficient and of inferior quality; the housing to have been more or less squalid, badly ventilated, and for the most part in noisome, overcrowded urban districts; the personal habits, unsanitary and unwholesome—hygienic defects the remedial indications for which are obvious and comparatively simple. In the case of the rich who develop tuberculosis, on the other hand, we may presuppose a diet which, while not insufficient, has been none the less pernicious, badly constructed, and lacking in nutritive efficiency; dwellings which pamper luxurious and not altogether hygienic tastes, rather than promote that simplicity of life upon which health in large measure must depend; personal habits which enervate rather than invigorate—hygienic defects demanding remedy none the less because they were not the results of poverty.

With the tuberculous poor, therefore, the problem demands a building-up process to approach the normal mean, while in the case of the well-to-do it is a curtailing process of "building down," as it were, to approach the

normal standard of good living. In either case the desired result can best be accomplished in the sanatorium. In fact, we are of the opinion that the well-to-do and rich need the restrictions, the discipline, the perpetual oversight, admonition, and encouragement in the fight for health quite as much as, if not more than, do the poor. Accustomed as is the former class to indulgences which are out of the reach of the poor, they are, when left to their own initiative, less apt to follow the strict line of procedure—involving, as it no doubt does, not a little personal discomfort and disciplinary adherence to rules of conduct—than is the case with the poor, whose whole life has been one of obedience to restrictive laws imposed by their poverty.

For educational purposes, schools are required for the rich as well as for the poor. The sanatorium is essentially a school. As an education may under certain conditions be achieved at home, or at least without institutional aid, so recovery from tuberculosis, which is to a large extent an educational process, may be achieved without the sanatorium. But as in the one case the results can be obtained only by bringing into the home the methods and experience of the schools, and even then at greater expense and less promise of success, so in the other case a home cure involves methods which have been worked out in sanatoriums, and which must be applied privately and with a much more than casual chance of success.

Class differences, however, whether fortunately or otherwise, do exist, which render the application of the principles involved more complicated, or at least somewhat different in the case of the well-to-do and the poor respectively. But it must not be forgotten that it is a difference of methods only and not of principles.

Simplicity of life and living, freedom from exhaustive mental or physical strain, a properly constructed diet, and a daily individual apportionment of rest and exercise under a constant skilled supervision are the essentials of sanatorium treatment, whether it be for the rich or for the poor.

As to the comparative needs of the well-to-do and the poor, it is evident to all that the very poor, and often the moderately poor, tuberculous patient, has a more crying need for sanatorium treatment than the tuberculous well-to-do invalid. Not only is the poor patient generally ignorant of the first principles of hygiene, but is often, alas! unable to afford the advice of a physician in regard to such matters. The sanatorium to him means his whole life made over. From filth to cleanliness—from fetid air to fresh outdoor air—for an insufficient and badly constructed diet a generous and wholesome one is substituted—from crowded city tenements he is removed to the quiet and repose of the open country. As a consequence he responds more rapidly, other conditions being equal, than does the well-to-do. It does not follow, however, that the well-to-do patient does not need sanatorium treatment for tuberculosis. The well-to-do have suffered greater

responsibilities, have generally had a more nervously strenuous life, and are more subject to nervous breakdown at the beginning and during the course of their disease.

The Essential Features of Sanatorium Construction and Régime in the Case of the Well-to-do.

Construction.—The construction and arrangement as well as the equipment of a sanatorium will depend, of course, upon the stage of the disease which it is proposed to admit for treatment. In all sanatoriums an effort is naturally made to secure as early stage cases as possible. In most public institutions, which are chiefly for the poorer classes, advanced cases are not admitted, or if so, in very limited number. In institutions intended to reach the well-to-do, on the other hand, a much larger proportion of advanced cases are necessarily admitted for treatment, and this obviously involves a more varied arrangement and method of construction.

The plan of building a sanatorium in a number of more or less separate and independent units has great advantages, but it is correspondingly expensive, both as to original cost and subsequent maintenance. In the case of a sanatorium for the financially well-to-do, where it is expected that the increased revenue will meet the additional cost of maintenance, this plan is undoubtedly the best. Such a plan includes:

(*a*) A substantial main building in which are located the various offices of administration, dining-halls, kitchens (which may be detached), medical offices, apartments for the staff, servants, etc.

(*b*) Cottages grouped about the administration building and within easy access thereto, for the accommodation of from four to ten or twelve patients, and maid, each. These buildings need not be expensive in design or construction; indeed, simplicity and absence of purely decorative features, both inside and outside, should distinguish them. Such buildings, perfectly adapted to the purpose, can be constructed and furnished for from $600 to $1000 per bed in the northern part of this country, and probably for less in the south, where provision to meet the exigencies of our northern climate need not be considered.

It is unnecessary here to enter upon a discussion of the details of construction of such buildings. Suffice it to say that ample provision should be made for "taking the cure" both day and night in such manner as shall offer the greatest possible privacy and comfort compatible with the object sought. Bathing facilities should be ample and convenient. Heating by hot water or steam may be from individual furnaces, or, better still, from a central heating plant.

(*c*) The hospital or infirmary should always, whenever possible, constitute a separate unit and be situated at such a distance from the main group

of buildings as shall offer the maximum of quiet and isolation consistent with easy accessibility from the administration building.

(*d*) A certain number of cottages arranged for independent administration (under a competent nurse-housekeeper) and more or less remote from the main group of buildings constitutes an admirable feature of such a sanatorium, but as such units are necessarily expensive to operate satisfactorily and without loss of the sanatorium idea, they have very naturally a limited field of usefulness.

The possibilities of elaboration of some such plan as that suggested are almost illimitable. The chief danger to be avoided in such a scheme, especially when funds are not lacking, is that of losing sight of the essential simplicity in both construction and equipment, as well as in operation, which the success of such a plan demands.

Whether for the rich or for the poor, the environment of a sanatorium where patients are compelled to remain for so long a time is a matter of greatest importance. Such environment must of necessity be attractive and offer opportunities for diversion and recreation, mental and physical, which form no inconsiderable part in the therapeutics of tuberculosis.

Régime.—During the acute or active stages of the disease, or in the presence of certain complications, rest, as nearly absolute as possible, is, of course, imperative. Of late years, however, there has been a growing tendency to employ physical exercise in one form or another as a therapeutic measure as soon as the active stage of the disease is past.

The credit of first instituting a systematic graded exercise for this purpose into sanatorium régime undoubtedly belongs to White Haven Sanatorium in Pennsylvania, where—in the form of profitable labor, graded as to time and severity to suit the individual capacity of the patient—it has been employed constantly since the opening of the sanatorium. The rationale of this treatment was at first not clearly understood, and it was employed with a view chiefly to determine the eligibility of patients to resume their various occupations after leaving the sanatorium.

More recently Dr. Patterson and his colleagues in Frimley Sanatorium in England, and still more recently Doctor Bardswell and his co-workers in King Edward VII Sanatorium, have utilized physical labor carefully graded to the individual—more systematically and scientifically, with the definite view of promoting autoinoculations and thereby raising the individual index of resistance. This feature of the treatment, especially where employed in sanatorium régime, has unquestionable advantages and ought not to be neglected.

To introduce a suitable muscular exercise in the form of physical labor into sanatorium treatment of the wealthy and well-to-do, however, is not a problem of easy solution; especially is this the case where women are con-

cerned. To be effective for best results, whatever exercise is prescribed must be taken with punctual regularity and constancy of purpose. Those who have had experience realize how difficult it is to get patients of any class to follow closely and conscientiously a routine involving tiresome and monotonous repetition. This difficulty is enhanced wherever the exercise is profitless, and is often frankly eschewed by the intelligent patient who is not of the laboring class.

To organize a plan of muscular exercise, therefore, which shall have a definite and progressive object, which, over and above its therapeutic value, shall present profitable possibilities to the intelligent mind, and be of such a nature at the same time as shall not seem degrading or offensive to the tastes of the fastidious, becomes the duty of those in charge of sanatoriums for the well-to-do. Such a plan, once organized, must be consistently adhered to, and its operation given its full and serious significance in such manner as shall enlist the hearty coöperation of the patient. This feature of the treatment is perhaps the most difficult to adapt to the well-to-do classes.

But hardly less difficult is the task of educating the well-to-do patient in the matter of dietetics. Like the poorer patient, he comes to the sanatorium imbued with the most grotesque and exaggerated ideas of the relative values of foods. In this country he has been taught that the cure of tuberculosis is almost wholly a question of capacity for raw eggs and rich milk, and to disabuse his mind of such fallacies and to teach him the fundamental principles of a properly constructed diet form a large and important part in the régime of the sanatorium, no matter for what class of patients intended. Individuals of the well-to-do classes are, if anything, more obstinately tenacious of preconceived ideas than are the poor, and the fact that their means have in the past made it possible for them to secure proper food is unfortunately no guarantee that they have profited by such circumstance.

The Essential Peculiarities of Psychic Features in the Treatment of the Tuberculous Well-to-do.

Treatment.—The treatment of the well-to-do in the sanatorium becomes more of an art than is the case with the poor. Discipline, fresh air, food, and rest are not alone enough. Special idiosyncrasies have to be studied. Overcoming idleness and suggesting amusement, carefully selected for each individual, are features of the routine, and suggestive therapeutics become a strong factor. These patients of the wealthier class have been accustomed to indulge their desires and appetites, and are therefore more critical. Slight difficulties and troubles become magnified in their eyes; they become introspective, are very apt to gossip, and slight social differences are often harped upon. Unlike the poor consumptive, who after his arduous life

is quite contented to rest and do little thinking, the well-to-do are of the nervous, strenuous kind, and need the discipline of physical labor as a diversion in overmental excitability.

The treatment, therefore, of the well-to-do in a sanatorium is a far more difficult and arduous undertaking than is the case with the poor. With the poor it is largely a question of the physical adjustment of the individual to the necessities of the case—the study of his bodily wants in a large measure—merely to bring up his standard of living. In his case the problem is a comparatively simple one. But with the well-to-do not only have we the physical problem to solve, as we have with the poor, but the treatment of the overcharged and weakened nervous system, the necessity for promoting mental as well as physical control, and, above all, the skilful and tactful use of psychic therapy, in order to properly encourage, educate, and cure.

Finally.—When all is said and done, the fact remains that, as beautiful and appropriate architectural design and perfect masonry do not make the university, neither do the most perfect buildings and the most glorious environment make a sanatorium. In the one case the personnel of the faculty will determine the success or failure of the university, whether it be in ancient and time-honored halls or in some rough inclosure in the wilderness. So in the other case success will depend upon the personnel of the staff. The very best results may be obtained in an old barn or shed on some worn-out, deserted farm, while dismal failure is not impossible in buildings of most perfect design and equipment and in a climate beyond reproach, if the physician and his staff are not adapted to the work in hand and are not imbued with the spirit of disinterested enthusiasm and determination.

Sanatoria para la Gente Acomodad.—(GARDINER, SWAN, AND KING.)

1. Cuál es la diferencia esencial entre lo que requieren los tuberculosos acomodados y aquellos verdaderamente pobres.

Aunque los principios del tratamiento de la tuberculosis son los mismos para el rico como para el pobre, los métodos de aplicación difieren necesariamente en algo, debido principalmente á la diferencia de los alrededores, hábitos, educación y condición social de las dos clases respectivamente.

En ambos casos el Sanatorio suministra los mejores medios para la aplicación de los principios.

El Sanatorio esencialminte una institucion educacional.

2. Disposiciones esenciales en la construcción de Sanatorios y régimen en el caso de gente acomodada.

En al caso de gente acomodada ó rica, el arreglo y la construcción debe ser tal que suministre el mejor acomodo personal y privado que pueda concederse en vista del objeto.

En el caso de gente acomodada son preferibles los planes de "Cabañas" ó "Unidades Independientes."

Da localización, los alrededores y el clima son mayor deciderata que en los casos de gente verdaderamente pobre.

En ambos casos es necesarie un ejercicio fisico cuidadosamente graduado y competenetemente inspeccionado; pero por varias razones es más dificil la aplicación terapéutica en el caso de las clases acomodadas y constituye uno de los difíciles problemas en el tratamiento de Sanatorio.

El manejo de la dieta es siempre esencial y comunmente difícil en el caso de tratamiento de Sanatorio de los ricos, más que cuando son pobres los pacientes. No se presta suficiente atención al asunto de la dieta en la meyor parte de los Sanatorios, ya sea para ricos ó para pobres.

3. Peculiaridades esenciales del médico en el tratamiento de los tuberculosos acomodados.

Es en este campo que el tratamiento de Sanatorio para la gente acomodada es más complicado.

El éxito ó la desgracia del Sanatorio dependerá en todo caso más de la personalidad y calificación del médico en cargo que de las ventajas de la arquitecturaà equipo y clima de la institución.

SECTION II.

Clinical Study and Therapy of Tuberculosis. Sanatoriums, Hospitals, and Dispensaries (*Continued*).

FIFTH DAY. AFTERNOON SESSION.

Friday, October 2, 1908.

MISCELLANEOUS CONTRIBUTIONS.

Section II of the International Congress on Tuberculosis was called to order by the President, Dr. Vincent Y. Bowditch, at half-past two o'clock.

VALEUR DIAGNOSTIQUE DU CYTO-EXAMEN DES EPANCHEMENTS TUBERCULEUX DANS LES DIVERSES SÉREUSES.

PAR A. CADE,

de l'Université de Lyon, médecin des hôpitaux, assistant du professeur J. Teissier.

Nous apportons dans ce court travail un résumé très concis et très général de nos observations relatives au cyto-examen des Epanchements tuberculeux des séreuses. Il nous a paru que ces observations étaient aujourd'hui assez nombreuses pour nous permettre d'exprimer une opinion ferme sur la valeur sémeiologique du cytodiagnostic de Widal, particulièrement en ce qui concerne les épanchements de la plèvre. Nos examens, effectués en grande partie avec la collaboration de notre collègue et ami le Dr. Barjon, ont porté, depuis plus de sept ans, sur un grande nombre de malades, dont beaucoup ont été l'objet de plusieurs examens successifs, rapprochés ou éloignés, pratiqués sur des liquides extraits de la même séreuse ou de séreuses différentes.

Nous aurons surtout en vue les épanchements des plèvres, du péritoine et des espaces sous-arachnoïdiens.

Pour la *vaginale*, le *pêricarde*, les *séreuses articulaires*, nos observations

d'épanchements, où la tuberculose puissse être incriminée, sont en trop petit nombre pour que nous puissions en tirer des conclusions rigoureuses. Nous ne nous y arrêterons donc pas d'avantage, indiquant seulement, en passant, que ces quelques faits ne nous inclinent pas, en tous cas, à admettre ici une schematisation cytologique très utile au diagnostic.

Nous avons hâte d'en arriver aux *épanchements pleuraux*, que nous avons plus spécialement étudiés. C'est pour eux que le cytodiagnostic de Widal conserve indiscutablement toute sa valeur. Nous nous occuperons avant tout des épanchements sero-fibrineux, accessoirement des épanchements hémorrhagiques. Nous éliminerons les épanchements purulents, qui ne nous ont jamais offert de particularité intéressante.

Nous ferons remarquer tout d'abord, qu'il est presque toujours possible d'identifier les éléments cellulaires contenus dans le dépôt du liquide centrifugé. Quelquefois cependant, nous avons eu des difficultés de ce genre dans l'examen de quelques épanchements sero-fibrineux très anciens. Il nous a semblé que cette éventualité, plutôt exceptionnelle, était relativement moins rare avec les épanchements hémorrhagiques. En somme, il est à peu près toujours possible d'établir la formule cytologique d'un épanchement pleural.

Un premier fait se dégage de nos observations: c'est qu'en dehors de la tuberculose, on n'observe jamais une lymphocytose aussi pure ni aussi prédominante. Par contre, tous les épanchements tuberculeux de la plèvre ne présentent pas constamment la formule lymphocytaire dans toute sa netteté.

Le cytodiagnostic pleural ne peut donc nous faire affirmer à tort la tuberculose, mais risque seulement de nous la laisser méconnaître dans certains cas qui en dépendent cependant manifestement. Quelles sont donc la proportion et les conditions d'apparition des formules anormales?

Nous tiendrons compte ici seulement des cas suivis de vérification nécropsique ou d'inoculation positive au cobaye. Nous en avons réuni cinquante (tous séro-fibrineux). Dans trente-et-un, la lymphocytose était très prédominante, parfois presque pure ou même, dans quelques observations exceptionnelles, absolument pure.

Dans les autres faits, il s'agissait de formules mixtes: lymphocytes et polynucléaires; lymphocytes et cellules endotheliales; lymphocytes, polynucléaires et cellules endotheliales, en proportions variées. Mais, dans presque tous ces cas, sauf deux sur lesquels nous reviendrons, le chiffre des lymphocytes reste notable.

Ces formules mixtes s'observent particulièrement, comme nous l'avons montré avec Barjon* au début des pleurésies tuberculeuses (dans les

* Société médicale des Hôpitaux de Lyon, 1902, et Archives générales de Médecine août 1902.

trois premières semaines de leur évolution). Des examens successifs lèveront donc le plus habituellement tous les doutes, en montrant le passage plus ou moins rapide à la formule classique.

Parfois, l'adjonction de cellules endotheliales aux lymphocytes paraît attribuable à la superposition de troubles de la circulation à l'infection tuberculeuse de la plèvre. Ainsi, dans une de nos observations, il s'agit d'une pleurésie bacillaire associée à une péricardite de même nature. La formule initiale nous donne:

lymphocytes.....66%
polynucléaires.....27%

grands mononucléaires (cellules endotheliales isolées) 7%

Ultérieurement, nous trouvons:

polynucléaires.....13.5%
lymphocytes.....48.5%
mononucléaires.....20 %
cellules endotheliales.....18 %

Dans un autre fait, il s'agit d'un épanchement apparu chez un sujet porteur d'un anévrisme de l'aorte. La cytologie montre des cellules endotheliales et des lymphocytes associés par proportions à peu près égales, et, à l'autopsie, nous notons une grosse atelectasie du poumon par compression de son hile et une éruption récente de granulations pleurales.

L'explication de la formule mixte et surtout de l'adjonction des polynucléaires aux lymphocytes semble résider parfois dans l'apparition de la pleurésie secondairement à des lésions tuberculeuses plus ou moins étendues du poumon sous-jacent. C'est là une opinion justement défendue par Mrs. Widal et Ravaut.

Ainsi, par exemple, un de nos malades montre à la première ponction, 82% lymphocytes et 18% petits mononucléaires. Deux mois après, ce même malade présente des lésions pulmonaires en évolution, et, à cette date, nous trouvons dans son épanchement 60% lymphocytes et 40% polynucléaires. Dans les cas analogues, on trouve en outre assez souvent, un chiffre notable de cellules endotheliales, le plus souvent isolées.

Au cours des poussées granuliques pulmonaires, la formule peut devenir mixte par adjonction de polynucléaires et de cellules endotheliales en quantité notable. Nous en avons relevé quelques très rares exemples.

Il est des cas de formules mixtes pour lesquels nous ne sommes en droit, du moins apparemment, d'invoquer aucune des explications précédentes. Il faut connaître ces faits, plutôt rares d'ailleurs, pour ne point méconnaître, au nom de la cytologie, la nature bacillaire d'un épanchement pleural. Ainsi, chez une femme atteinte de tuberculose ganglionnaire et synoviale à localisations multiples et présentant une pleurésie déjà ancienne, nous notons une formule à prédominance endotheliale, les cellules endotheliales

étant isolées et en voie de désintégration. Cet épanchement pleural provoque chez le cobaye une tuberculose généralisée. Nous n'avons pu trouver aucune explication de cette formule anormale.

Dans un autre cas d'épanchement tuberculeux ancien, avec inoculation également positive, nous notons à l'examen cytologique les résultats suivants:

polynucléaires.....50%
lymphocytes.....40 à 45%
quelques cellules endotheliales, pour la plupart isolées.

Nous devons ajouter, il est vrai, que certains des leucocytes polynucléaires ici constatés sont peut-être de pseudo-polynucléaires, résultant de modifications dégénératives des cellules endotheliales. La formule n'en reste pas moins anormale, et cette anomalie, d'explication difficile.

En tout cas, dans l'observation suivante, tous les polynucléaires, notés à l'examen du dépôt de centrifugation, ne laissent aucun doute sur leur nature et ils sont encore plus abondants. Il s'agit d'un malade dont nous venons de publier avec Paul Courmont et Fernand Arloing, l'histoire complète:* atteint d'une pleurésie tuberculeuse ancienne, que nous ponctionnons et étudions à plusieurs reprises, nous trouvons chaque fois une formule mixte (cellules endotheliales, lymphocytes et polynucléaires) avec une prédominance nette des éléments polynuclées. L'autopsie ne nous a pas permis d'attribuer cette anomalie à des lésions tuberculeuses du poumon sous-jacent. Quant à incriminer une infection secondaire, cela parait difficile: la culture du liquide reste en effet habituellement négative, sauf la première fois, où elle permet d'obtenir le développement banal de staphylocoques, attribuable probablement à une infection accidentellement produite au cours des manipulations.

Les quelques observations précédentes n'enlèvent rien de sa valeur à l'examen cytologique des épanchements pleuraux. Elles prouvent seulement qu'on doit toujours être très prudent dans ses conclusions et qu'il existe des faits exceptionnels dont l'interprétation cytologique nous échappe encore.

Dans les cas où la formule est anormale (abondance de polynucléaires ou de cellules endotheliales) on devra, si l'épanchement est encore récent, attendre, pour se prononcer, un nouvel examen pratiqué trois semaines au moins après le début de la pleurésie.

La persistance de la formule anormale, passé ce délai, ne permettra point d'utiliser le cyto-examen pour le diagnostic.

L'évolution clinique et les autres procédés de laboratoire devront seuls alors assurer celui-ci et ne pas permettre, par exemple, qu'on attribue à une infection aiguë de poumon une polynucléose très prédominante, ou

* P. Courmont, A. Cade, F. Arloing: Étude des propriétés humorales dans un cas de pleurésie mortelle. Société médicale des hôpitaux de Lyon et Lyon médical, juin 1908.

qu'on incrimine une congestion pulmonaire plus ou moins intense ou un infarctus en présence d'une formule mixte, comprenant des lymphocytes, des cellules endotheliales et surtout des polynucléaires, ces derniers éléments devenant très nombreux dans les épanchements pleuraux des cardiaques avec infarctus pulmonaires, comme nous l'avons montré, en 1901, avec F. Barjon.

L'étude des épanchements hémorrhagiques va nous fournir des conclusions assez analogues à celles, que nous a suggérées l'examen des pleurésies séro-fibrineuses. Sur onze cas, dont la nature tuberculeuse est rendue indiscutable par le caractère positif de l'inoculation au cobaye ou de la vérification nécropsique, nous avons sept cas de lymphocytose très prédominante. Dans les autres faits, la formule est anormale et offre une mélange en proportions variables de lymphocytes, polynucléaires et cellules endotheliales. Dans une observation, ces deux derniers éléments occupent presque uniquement le champ de la préparation: il s'agit d'une pleurésie tuberculeuse ancienne, avec poussée granulique récente du poumon sous-jacent, comme le révèle la vérification nécropsique.

Dans une autre observation, la polynucléose de l'épanchement pleural est presque pure (97%): il est vrai que l'autopsie révèle des lésions tuberculeuses du pumon. L'épanchement paraît donc secondaire, et cette constatation peut nous rendre compte de l'anomalie de cette formule.

Nous signalerons encore un fait de pleurésie hémorrhagique tuberculeuse, dont la formule mixte vint rapidement se compliquer par l'adjonction d'une proportion importante de leucocytes éosinophiles: 23%, puis 13%. Messrs Widal et Ravaut ont rapporté un fait analogue dans lequel les leucocytes éosinophiles atteignirent le taux de 54 %. Il s'agissait d'un épanchement secondaire à des lésions tuberculeuses du poumon.

Nous n'avons voulu jusqu'ici tenir compte que des observations contrôlées par une vérification nécropsique ou une inoculation au cobaye. Nous pourrions, si nous nous montrions moins intransigeant, ajouter aux cas précédents un grande nombre de faits, qui, d'après la clinique, rentrent d'une façon indiscutable dans le cadre de la bacillose pleurale. Antécédents, allure clinique, évolution, tout cela, joint habituellement à des signes tirés de l'examen du sommet du poumon et rendant celui-ci suspect, nous fait considérer ces épanchements comme très probablement tuberculeux.

L'inoculation reste, il est vrai, négative, mais c'est là un criterium qui n'a rien d'absolu, comme le prouvent certaines constatations d'autopsie et comme le prouvent également le succès isolé de telle inoculation, alors que d'autres inoculations pratiquées à d'autres animaux, dans les mêmes conditions, avec le même liquide, restent sans effet.

Or, dans la grande majorité des nombreux cas auxquels nous venons de faire allusion, la formule cytologique est à grande prédominance lymphocytaire.

Dans quelques faits de ce groupe, fort intéressantes, mais encore peu nombreux, il s'agit de formules mixtes, avec éosinophilie, la proportion des cellules éosinophiles s'élevant de 10 à 46%.

De l'étude que nous avons consacrée avec Barjon* à cette formule spéciale, d'ailleurs rarement rencontrée, nous avons conclu qu'on trouvait, celle-ci plus spécialement dans les pleurésies aiguës, à faible épanchement, n'ayant pas de tendance à se reproduire et ne tuberculisant pas le cobaye. Parmi nos observations, il en est qui ne touchent pas à la tuberculose; il en est d'autres dans lesquelles l'intervention de cette infection peut être soupçonnée. En admettant donc qu'il faille rester sur la réserve au point de vue de la valeur diagnostique de l'éosinophilie vraie, nous ne pouvons en tout cas nous refuser à admettre qu'elle est l'indice d'un pronostic favorable, puisque, dans les faits où la tuberculose est soupçonnable, celle-ci parait singulièrement atténuée. Il y a là l'ébauche d'un véritable cyto-pronostic.

Il nous reste à exposer nos résultats concernant les épanchements tuberculeux du péritoine et le liquide cephalo-rachidien des méningites tuberculeuses. On verra que la cytologie n'apporte ici qu'un assez faible appoint au diagnostic.

Nous réunirons 13 cas de *péritonites*, dont la nature bacillaire est affirmée soit par la nécropsie ou les constatations opératoires, soit par le caractère positif de l'inoculation au cobaye. Sur ces 13 cas, nous trouvons le plus souvent une formule mixte: lymphocytes, polynucléaires et cellules endotheliales voisinent là en proportions variables. Dans la majorité des observations, le lymphocyte est prédominant, mais cette prédominance, qui n'est pas absolument constante, peut être faible. Dans cinq cas cependant elle est considérable et va de 70 à 90%. Dans trois cas où la cellule endotheliale atteint ou même dépasse le taux du lymphocyte, on peut adjoindre au bacille de Koch, dans la pathogénie de l'épanchement péritonéal, un élément mécanique: cirrhose du foie, symphyse du péricarde.

Quelle que soit d'ailleurs l'interprétation de cette abondance des éléments endotheliaux dans les épanchements tuberculeux du péritoine, il reste ce fait que l'interprétation de la formule cytologique en pareil cas est souvent malaisée, et que, par conséquent la valeur du cyto-diagnostic devient ici très modeste. Elle doit l'être d'autant plus qu'on peut trouver, dans des épanchements de nature non bacillaire, des lymphocytes en quantité notable.

Exception faite pour les cas, où le lymphocyte est très prédominant dans l'épanchement, le cyto-diagnostic ne pourra guère permettre d'affirmer la tuberculose. Il ne permettra de l'éliminir que dans les cas où on note les caractères cytologiques bien connus de l'épanchement cancéreux. Quant

* F. Barjon et A. Cade: Eosinophilie pleurale: cyto-diagnostic et cyto-pronostic, Archives générales de médecine, 1903.

à la grande prédominance des éléments endotheliaux, elle constitue une présomption contre l'intervention du bacille de Koch sans l'éliminir d'une façon ferme, puisque les épanchements péritonéaux à pathogénie complexe, à la fois mécanique et bacillaire, sont loin d'être exceptionnels.*

L'étude du *liquide cephalo-rachidien* dans la méningite tuberculeuse (chez l'adulte) nous montre que le cyto-diagnostic ne possède pas ici une valeur très supérieure à celle que nous venons de lui accorder dans la bacillose péritonéale.

Sur 10 cas avec vérification nécropsique, nous trouvons 5 fois une polynucléose prédominante pouvant atteindre 76 et 80%. Dans les autres observations, les lymphocytes sont en majorité, mais souvent encore accompagnés par un nombre respectable de polynucléaires. Le fait de la fréquence de la polynucléose cephalo-rachidienne dans la méningite tuberculeuse, joint à la banalité de la lymphocytose dans un grand nombre d'états morbides divers, ne permet pas en définitive d'attacher au cyto-examen une très grosse valeur pour le diagnostic de la méningite tuberculeuse. Si nous pouvons affirmer ainsi l'existence d'une réaction méningée, il ne saurait en être de même pour sa nature.

Nous devons donc *conclure* que la cytologie des épanchements, procédé d'examen très simple et très facile, est susceptible d'apporter au diagnostic de la nature des pleurésies un appoint considérable.

La constatation d'un grande prédominance lymphocytaire est un argument de choix en faveur de la tuberculose.

Le cyto-diagnostic pleural ne peut nous faire affirmer à tort la tuberculose, mais il risque seulement de nous la laisser méconnaître, les formules anormales étant loin d'être exceptionnelles.

Les anomalies de la formule cytologique reconnaissent diverses explications, mais certaines restent encore mystérieuses.

La cytologie des épanchements tuberculeux des autre séreuses n'a qu'une valeur sémeiologique très discutable. Il faut en excepter cependant la très grande prédominance lymphocytaire dans l'ascite tuberculeuse, éventualité qui est loin d'ailleurs d'être très commune.

D'une façon générale, les constatations cytologiques doivent être interprétées avec prudence, contrôlées souvent par les autres procédés de laboratoire et toujours rapprochées des notions fournies par la Clinique.

Nous croyons interessant de donner ici la liste des travaux lyonnais, publiés sur la question du cytodiagnostic (par ordre chronologique). Mais nous tenons auparavant à rendre hommage aux belles recherches initiatrices de M. Widal le createur du cytodiagnostic. Les nombreux travaux, qu'il a publiés sur cette question, avec ses eléves, sont aujourd'hui classiques; et nos recherches personnelles, comme on l'a vu précedemment, confirment dans l'ensemble ses propres conclusions particulièrement en ce qui a trait à l'importance sémeiologique de la lymphcytose dans la pleuro-tuberculose.

* A. Cade: Valeur sémeiologique de l'Examen cytologique des épanchements péritonéaux. Archives de Médecine Expérimentale et d'Anatomie Pathologique, 1906.

1. F. Barjon et A. Cade: Examen cytologique des épanchements pleuraux, Société nationale de médecine de Lyon, 24 juin 1901; Lyon médical, août 1901.
2. F. Barjon et A. Cade: Formule cytologique spéciale des pleurésies par infarctus chez les cardiaques, Bulletin de la Société de Biologie, 1901, p. 646; Province médicale, 1901, p. 313.
3. F. Barjon et A. Cade: Liquide cephalo-rachidien et méningite chronique dans un cas de maladie de Friedreich: Société de Biologie, mars 1901; Province médicale, 1901, p. 136.
4. J. Courmont et F. Arloing: Cytologie des pleurésies: Société Médicale des Hôpitaux de Lyon, 7 mars 1902.
5. F. Barjon et A. Cade: Sur l'interprétation de la formule cytologique des épanchements dans les séreuses d'après plus de cent examens: Société Médicale des Hôpitaux de Lyon, 7 mars, 1902; Bulletin de la Société, p. 142.
6. Paul Courmont: Résultats comparés du cyto-diagnostic et du sero-diagnostic tuberculeux des épanchements des séreuses: Bulletin de la Société Médicale des Hôpitaux de Lyon, 14 mars 1902, p. 157.
7. J. Courmont et Montagard: Cytologie des méningites: Société Médicale des Hôpitaux de Lyon, 23 mai 1902.
8. F. Barjon et A. Cade: Note sur la cytologie du liquide cephalo-rachidien dans les méningites tuberculeuses: Bulletin de la Société Médicale des Hôpitaux de Lyon, 23 mai 1902, p. 331.
9. F. Barjon et A. Cade: Un cas de méningite tuberculeuse: Bulletin de la Société Médicale des Hôpitaux de Lyon, 23 mai 1902, p. 328.
10. Mollard et André: Méningite tuberculeuse à début spinal et de durée prolongée: Société Médicale des Hôpitaux de Lyon, 23 mai 1902.
11. F. Barjon et A. Cade: Cytologie des Hydrocèles—Présence des spermatozoïdes dans les hydrocèles essentielles—Pathogénie de ces hydrocèles: Société de Biologie, 7 juin 1902. Province Médicale, 12 juillet 1902.
12. F. Barjon et A. Cade: Contribution à l'étude cytologique des pleurésies tuberculeuses: Archives générales de médecine, août 1902.
13. F. Barjon et A. Cade: Contribution à l'étude cytologique des épanchements pleuraux des brightiques et des cardiaques: Archives générales de médecine, octobre 1902.
14. F. Barjon et A. Cade: A propos des hydrocèles (Cytologie—Inoculations—Résultats). Société nationale de Médecine de Lyon, 23 juin 1903; Lyon Médical, 5 juillet 1903; Archives générales de Médecine, 1903.
15. F. Barjon et A. Cade: Eosinophilie pleurale—Cyto-diagnostic et cyto-pronostic: Bulletin de la Société Médicale des Hôpitaux de Lyon, 23 juin 1903, p. 336; Archives générales de Médecine, 1903.
16. Roque et Leriche: Méningite cérébro-spinale à pneumocoques: Société nationale de Médecine de Lyon, 30 novembre 1903.
17. A. Cade: Examen cytologique du liquide cephalo-rachidien dans la méningite tuberculeuse: Société Médicale des Hôpitaux de Lyon, 6 mars 1906; Lyon Médical, 1906, p. 578.
18. Chavigny: Les méningites et leur diagnostic par les procédés de laboratoire: Société Médicale des Hôpitaux de Lyon, 6 mars 1906; Lyon Médical, 1906, t. i, p. 582.
19. Pauly: Méningite tuberculeuse sans réaction leucocytaire du liquide cephalo-rachidien: Société nationale de Médecine de Lyon, 25 juin 1906; Lyon Médical, 1906, t. ii, p. 100.
20. A. Cade: Valeur sémiologique de l'examen cytologique des épanchements péritonéaux: 35me Congrès de l'Association Française pour l'avancement des Sciences (Lyon, 1906); Archives de Médecine Expérimentale et d'Anatomie pathologique, Novembre 1906.
21. L. Jaubert: Signification de la polynucléose rachidienne au cours de la méningite tuberculeuse: Province Médicale, 1907, p. 74.
22. Roque et Chalier: Valeur diagnostique de l'examen du liquide cephalo-rachidien dans les méningites: Société médicale des Hôpitaux de Lyon, juin 1908; Lyon Médical, 1908.
23. Paul Courmont, A. Cade et F. Arloing: Etude des propriétés humorales au cours d'une pleurésie tuberculeuse mortelle (Cyto-pronostic, hypofibrinose, séro-pronostic défavorable): Société Médicale des Hôpitaux de Lyon, juin 1908; Lyon Médical, 1908.

Diagnostic Value of the Cytologic Examination of Tuberculous Effusions in the Various Serous Cavities.—(CADE.)

The cytology of effusions (Widal) requires a very simple and very easy method of examination, and is of considerable aid in determining the nature of a pleurisy.

A great predominance of lymphocytes is a strong argument in favor of tuberculosis.

There is no danger of making a mistaken diagnosis of tuberculosis on the strength of the cytologic findings in a pleural effusion; the only risk is that the condition may be mistaken for something else, as abnormal formulas are by no means exceptional.

The anomalies of the cytologic formula are susceptible of various explanations, but some of these anomalies are still quite mysterious.

The cytology of tuberculous effusions in other serous cavities has a very questionable semeiologic value. We must except the great predominance of lymphocytes in tuberculous ascites, an occurrence which, however, is by no means a very common one.

In general, cytologic findings must be interpreted with caution, they often need to be controlled by other laboratory examinations, and should always be compared with the data obtained by clinical observation.

Valor Diagnóstico del Examen Citológico de la Efusión Tuberculosa en las Varias Cavidades Serosas.—(CADE.)

El examen citológico de la efusión (Widal) requiere un método simple y fácil y ésta es de una ayuda considerable para determinar la naturaleza de la pleuresa. Un marcado predominio de linfocitos es un argumento poderoso en favor de la tuberculosis.

Basándose sobre los resultados de un examen citológico, no hay peligro de hacer un diagnóstico errado sobre el caracter de la efusión de la pleura; el único riesgo es que la condición puede ser tomada por otra cosa, puesto que fórmulas abnormales no son del todo excepcionales.

Las anomalías en la fórmula citológica admite varias explicaciones, más algunas de estas anomalías son todavía misteriosas.

La citología de la efusión tuberculosa en otras cavidades serosas tiene un valor semiológico dudoso. Es de esperarse la gran preponderancia de linfocitos en la efusión peritoneal de caracter tuberculoso, una ocurrencia que de antemano no es muy común.

Por lo general, los resultados citológicos deben ser interpretados con precaución; ellos muchas veces, necesitan ser corroborados por medio de otros exámenes de laboratorio y deberán ser siempre comparados con los resultados obtenidos de las observaciones clínicas.

RHUMATISME TUBERCULEUX ET TUBERCULOSE INFLAMMATOIRE.

PAR M. LE PROFESSEUR ANTONIN PONCET,
de l'Université de Lyon.

La pathologie se trouve quelque peu bouleversée par l'entrée en scène, il y a tantôt dix ans, du *Rhumatisme tuberculeux*. Il a révélé une pathogénie, jusqu'alors inconnue, d'un grand nombre de manifestations ostéo-articulaires, englobées sous l'expression vague et banale de: *rhumatisme*. Nous lui devons aussi la découverte d'une forme de tuberculose, insoupçonnée avant nos recherches, et à laquelle nous avons dû donner un nom également nouveau, celui de: *Tuberculose inflammatoire*.

Ces néologismes méritent d'être bien compris, car ils visent des états pathologiques nombreux, ils donnent la clef de processus, en apparence, très dissemblables, et cependant, de même nature. Nous voulons donc ici préciser, encore une fois, notre doctrine, pas toujours très bien comprise, d'après ce qu'il nous a paru dans des discussions récentes; bien indiquer ce qu'il faut entendre par les dénominations de: *Rhumatisme tuberculeux*, de *Tuberculose inflammatoire;* enfin, montrer les résultats acquis, le champ parcouru.

Cette tâche nous est rendue facile par des travaux de tout genre, sur ce double sujet, sortis de notre clinique.* Les plus importants, communiqués à l'Académie de médecine de Paris, ont été écrits en collaboration avec mon très distingué chef de clinique, le Dr René Leriche.

Le rhumatisme tuberculeux, nous l'avons dit souvent est un rhumatisme infectieux, qui a pris naturellement place parmi les autres rhumatismes infectieux bien connus. Le virus tuberculeux le conditionne, au même titre que d'autres virus, que d'autres poisons actionnent d'autres rhumatismes dont on prononce chaque jour le nom sans arrière pensée, tels, par exemple: le rhumatisme blennorragique, le rhumatisme puerpéral, le rhumatisme scarlatin, etc., etc.

L'usage, la tradition nosologique, de désir d'être vite et bien compris, etc., exigeaient donc l'adjonction, à la désignation de lésions articulaires,

* Voir à ce propos la très complète Revue générale parue dans la Revue de Médecine du 10 mai 1907: Le rhumatisme tuberculeux articulaire et abarticulaire, par H. Alamartine, interne des hôpitaux de Lyon.

dont la pathogénie venait d'être éclairée, du qualificatif qui en fixait l'origine, d'où le terme de: *rhumatisme tuberculeux.*

C'est la clinique qui nous l'a tout d'abord révelé, en nous montrant, chez des tuberculeux avérés, l'existence et la fréquence de localisations articulaires qui, par leur évolution, par leurs caractères cliniques, avaient bien le masque du rhumatisme ordinaire, du *rhumatisme*, disait-on; du *rhumatisme, tout court*, pourrions-nous ajouter, chez des tuberculeux, et qu'une analyse moins sommaire nous permettait bientôt de rattacher à la tuberculose et d'appeler: *rhumatisme tuberculeux.*

Dès 1903, nous écrivions en épigraphe du *Rhumatisme tuberculeux*—No. 34—de l'*Œuvre médico-chirurgical* du Dr. Critzman. Paris, Masson et Cie, éditeurs.

"Le rhumatisme que l'on observe chez les tuberculeux n'est généralement pas, comme on l'avait cru jusqu'à présent, une simple coïncidence, une maladie intercurrente, et pas davantage, une cause de tuberculose. Manifestations rhumatismales et tuberculeuses réunies ont une même pathogénie: *l'empoisonnement tuberculeux*, d'où: le *Rhumatisme tuberculeux.*"

Cinq ans se sont écoulés depuis la publication de ces quelques lignes (A. Poncet et M. Mailland, *loc. cit.*). Nous n'avons rien à y changer. Déjà, à cette époque, elles ne traduisaient pas une simple conception, mais bien le résultat de nombreuses observations cliniques, contrôlées par les moyens usuels d'investigation: examens histologiques, recherches expérimentales, bactériologiques, et Dieu sait si, pendant ces cinq dernières années, nous avons multiplié nos travaux, nos publications, sur ce sujet.

N'avons-nous pas cherché à justifier cette remarque si philosophique de Schopenhauer, que celui-là seul est l'inventeur qui sait faire valoir son invention?

Nous avons montré que le rhumatisme tuberculeux prenait le masque de toutes les formes connues du rhumatisme articulaire: formes subaiguës, aiguës (type Bouillaud), formes chroniques, noueuses, déformantes, formes sèches, plastiques, ankylosantes d'emblée, donnant lieu à des synostoses, à des ankyloses osseuses, sans le moindre processus antérieur ou présent de suppuration, de fongosités, etc.

Enfin, nous avons étudié le *rhumatisme tuberculeux abarticulaire*, avec ses localisations diverses, en particulier, sur le cœur, le rein, la peau, les méninges, le système nerveux, etc. En un mot, nous avons établi, que le rhumatisme tuberculeux se comportait, comme il fallait s'y attendre, à la manière des autres rhumatismes infectieux; que dernier venu, parmi eux, il en occupait, néanmoins, le premier rang, par son ubiquité, par son polymorphisme, par ses métastases, etc.

Accueilli, au début, avec scepticisme, parfois même, avec quelques sourires, le rhumatisme tuberculeux a fait son chemin, il est accepté aujourd'

hui par tout le monde, on ne discute plus guère que sa fréquence. Il en est à la dernière station de tout fait scientifique nouveau. Le moment n'est probablement pas éloigné, où ses assises seront telles, qu'il aura été connu de tout temps. . . Ce sont la des étapes, trop connues, sur la route de tout progrès, pour que nous ayons à nous étonner. Quant à la fréquence du rhumatisme tuberculeux, elle est malheureusement aussi réelle que son existence. La raison en est bien simple, elle réside uniquement dans ce fait brutal: la très grande fréquence de la tuberculose.

Quoi d'étonnant, dès lors, que des manifestations articulaires d'origine tuberculeuse se rencontrent volontiers? N'en serait-il pas de même des arthrites blennorragiques, par exemple, si, tout d'un coup, les blennorragiens augmentaient considérablement de nombre, s'ils atteignaient le pourcentage des tuberculeux, qui est, au bas mot, de 60 pour cent (certaines statistiques donnent 80 et au-dela).

J'arrive maintenant à une notion, que j'ai toujours jugée d'une importance capitale, je veux parler de la *Tuberculose inflammatoire.*

C'est le rhumatisme articulaire tuberculeux qui m'a mis sur la voie de cette deuxième grande variété de tuberculose.

Je m'explique.

Dès mes premières observations cliniques d'arthrites aiguës, subaiguës, d'aspect, d'allure rhumatismale, que je voyais, chez des tuberculeux, et que je supposais devoir être d'origine tuberculeuse, je comprenais mal, en raison même de leur apparition et de leur disparition, parfois rapide, qu'elles fussent vraiment tuberculeuses, c'est-à-dire qu'elles fussent le siège des lésions anatomiques, tuberculeuses, au sens classique, je dirais volontiers, dogmatique de ce mot.

Je restais perplexe au sujet de cette édification presque instantanée de tubercules, de granulations miliaires, de fongosités, etc., et plus encore de la production de lésions destructives: de noyaux caséeux, de suppuration, de mortification, d'ulcération, etc.

Je mis en doute, pour les motifs que je viens d'indiquer, toute formation pathologique tuberculeuse, tout produit tuberculeux spécifique.

L'ouverture opératoire de quelques-unes de ces articulations malades, quelques nécropsies, me confirmèrent bientôt dans cette opinion, qu'il n'y avait dans de telles jointures, ni altérations, ni exsudats, ayant, à l'œil nu, les signes des néo-formations tuberculeuses.

En était-il de même, au point de vue microscopique?

Je fis part de mes doutes à mon chef de Laboratoire, le Dr. Louis Dor, et nous voilà multipliant, dans des cas de ce genre, les examens histologiques.

Grande fut notre surprise, mais vive fut aussi, on le comprend, notre satisfaction, en constatant que, dans un grand nombre de cas, les examens histologiques confirmaient l'examen macroscopique qui avait été négatif.

Ici j'ouvre une parenthèse.

La tuberculose, telle qu'on l'enseigne et telle qu'elle est actuellement comprise par tous, est une maladie infectieuse, contagieuse, dont l'agent pathogène est le bacille de Koch.

Par lui-même, par ses toxines, ce bacille provoque das lésions tissuliares, admirablement étudiées, et décrites depuis longtemps, surtout histologiquement. Ces lésions, nous ne les suivrons pas dans leur développement, dans leur structure.

Il nous suffit de savoir qu'elles ont un aspect très particulier, qu'elles sont le résultat de réactions anatomiques constantes, sous des formes variées: tubercules, caséification, etc., en un mot qu'elles ont, suivant une expression courante, une *signature anatomique*, autrement dit encore, qu'elles sont *specifiques*.

La spécificité réactionnelle des éléments frappés, voilà le *Credo anatomopathologique*, sur lequel repose tout l'édifice anatomique de la tuberculose.

Nous avions été élevé dans de telles idées,—nous les considérions *comme des articles de foi*,—pour nous servir d'une locution confessionnelle, qui même dans le domaine des idées doctrinales scientifiques, n'a rien d'exagéré. Et voici que l'observation de chaque jour, au lit du malade, que les constatations, soit à l'amphithéâtre, soit sur la table d'opérations, étaient en opposition avec la doctrine régnante!

Longtemps nous restâmes hésitant sur l'interprétation pathogénique de ces lésions articulaires qui, sans *réaction tuberculeuse*, nous paraissaient être, cependant, de plus en plus, d'origine tuberculeuse. Les faits, en effet, s'accumulaient, des preuves nouvelles surgissaient, et insensiblement nous arrivions à cette notion:

Qu'à côté des *produits spécifiques tuberculeux* prenaient place des *produits, simplement inflammatoires*, et qui n'en étaient pas moins de nature tuberculeuse.

La tuberculose inflammatoire était née, c'est-à-dire cette variété de tuberculose, nous l'avons répété à satiété, uniquement constituée par des lésions inflammatoires courantes, allant, depuis la congestion la plus fugace, jusqu'à la sclérose définitive.

Son existence, ses diverses modalités témoignent, à coup sur, d'une atténuation, plus ou moins grande, du virus tuberculeux.

Ce n'est point aller au delà d'une compréhension rigoureuse des faits, que de dire:

Suivant le terrain, suivant la virulence des bacilles, etc., les réactions des tissus atteints sont différentes. Nous ne connaissions, jusqu'à ces dernières années, que la *forme virulente* ou *spécifique*, de l'infection tuberculeuse.

A ses côtés, doit, dorénavant, prendre place une tuberculose *aspécifique*,

certainement de moindre virulence, et qui comprend tout la gamme des *tuberculoses atténuées.*

Le terme de *tuberculose inflammatoire* convient, on ne peut mieux, à ces, manifestations bacillaires de moindre sévérité. Il est défini, précisément, par les caractères des lésions, qui sont ceux, nous le répétons, d'une inflammation quelconque, dont la nature ne peut être anatomiquement déterminée.

Des preuves de l'existence de la tuberculose inflammatoire, nous en avons fourni de tout genre.

Déjà, en 1903, dans les *Archives internationales de chirurgie* (vol. I, fasc. I, *loc. cit.*), nous avons divisé la tuberculose en trois grandes catégories:

1° La *tuberculose spécifique, avec tubercules,* etc., autrement dit avec *réaction anatomique spécifique.*

2° La *tuberculose, inflammatoire, avec réaction anatomique banale, comme dans toute espèce d'infections, d'intoxications* (rhumatisme tuberculeux articulaire et abarticulaire).

3° La *tuberculose septicémique,* ou *infectieuse, sans modifications anatomiques apparentes, sans lésions appréciables,* en un mot, *sine materia.*

Cette division, nous la maintenons, elle est justifiée chaque jour, par la clinique. Les recherche expérimentales et bactériologiques, l'ont définitivement sanctionnée.

S'il en etait besoin, nous dirions encore qu'elle répond à tout ce que nous savons du mode d'action, des nombreuses infections et intoxications.

La pathologie générale exige qu'il en soit ainsi.

Ce dernier aperçu philosophique n'est pas sans valeur. Il nous a, dans tous les cas, été précieux pour rendre *a priori,* tous les tissus, tous les appareils, tous les organes, justiciables de la tuberculose inflammatoire.

Le rhumatisme articulaire tuberculeux, qui n'est que la modalité sur les articulations de cette dernière forme de tuberculose, lui ouvrit bientôt la porte dans les autres séreuses, dans la tissu osseux, les viscères, etc., etc. Je veux dire par là, que ce qui était vrai pour les synoviales articulaires, le devenait bientôt pour les gaines tendineuses, pour les bourses muqueuses, pour le squelette, etc. N'eût-il pas été, du reste, on ne peut plus illogique, biologiquement et pathologiquement parlant, que l'infection bacillaire, affectât des formes différentes, suivant les différentes séreuses, y comprises, les plèvres, les méninges, le péritoine, etc., comme si la diversité de siège, même de fonction, constituait un privilège dans certains cas, une infériorité dans d'autres.

La pathologie générale est plus simpliste, la clinique, l'anatomie pathologique, le montrent bien. Les processus sont identiques malgré leurs localisations variées.

Dans cet ordre d'idées, nous devions bientôt franchir un nouveau stade.

Ici encore, le raisonnement ne venait qu'après des observations indica-

trices. Nous ne nous refusions pas, cependant, le droit de penser initialement, que si la tuberculose spécifique se montrait partout, ne respectait aucun tissu, aucun organe, il pouvait bien en être de même de sa jeune sœur, la tuberculose inflammatoire?

Et puis, sans abuser des assimilations et des comparaisons, quelle grande différence existe-t-il donc entre une maille du tissu conjonctif, sous-cutané, intra-viscéral, etc., et une bourse séreuse? Question de morphologie, de classification, au fond pas autre chose. Elle s'étend, cette question, aux éléments nobles, au tissu épithélial. Endothélium, épithélium, profonds, superficiels, se valent, au point de vue des infections et des réactions pathologiques. Tout au moins, nous en jugeons ainsi, et orientés dans cette voie, les faits nous ont donné raison.

La tuberculose inflammatoire se rencontre partout.

C'est elle qui commandite souvent les fluxions, les congestions fugaces, passagères, les cirrhoses, etc., nombre d'états pathologiques très mal définis, surtout au point de vue pathogénique. Quand nous aurons répété qu'elle prend volontiers le masque de *l'arthritisme*, du *neuro-arthritisme*, qu'elle est, par excellence, la *diathèse fibreuse*, etc., nous aurons, à peine, esquissé son vaste champ d'action.

On a pu dire avec quelque ironie "que ce n'était pas la tuberculose que nous plaçions dans la pathologie, mais la pathologie dans la tuberculose." Nous n'en disconvenons pas. Une telle boutade n'est point faite pour nous déplaire.

Qu'on le veuille, ou non, la tuberculose qui est très commune dans sa forme *spécifique:* granulique, caséeuse, destructive, fongueuse, etc., ne l'est pas moins dans sa forme *aspécifique*, qu'on pourrait appeler encore *tuberculose sans tubercules*, mais à laquelle convient, encore mieux, le nom de *tuberculose inflammatoire*, pour des raisons déjà exposées et sur lesquelles nous ne reviendrons pas.

Elle comprend, nous aimons à le dire de nouveau, toute la série des infections bacillaires atténuées, infections purement congestives, scléreuses, etc. Elle empiète, d'autre part, sur le terrain néoplasique, ainsi que nous l'avons déjà établi avec Leriche, par la description de la *Tuberculose inflammatoire* à *forme néoplasique*, c'est-à-dire de *néoplasmes inflammatoires d'origine tuberculeuse:* adénomes, lipomes, exostoses, etc., etc., et l'on s'étonne que le domaine de la tuberculose se soit démesurément agrandi!

C'est la clinique qui nous a guidé dès le début. C'est elle qui nous a fait découvrir le rhumatisme articulaire tuberculeux. Ce dernier, qui n'est qu'un rameau articulaire, si l'on nous permet cette expression, de l'arbre représenté par la *tuberculose inflammatoire*, nous a mis sur la voie de cette dernière. Chaque jour, notre doctrine se confirme de plus en plus.

Il arrivera certainement pour les autres localisations et modalités de la

tuberculose inflammatoire, ce qui est arrivé pour l'une d'entre elles, pour le rhumatisme articulaire tuberculeux. Anneaux d'une même chaine, on peut leur prédire le même avenir, c'est-à-dire leur entrée prochaine dans la pathologie classique.

Dans nos recherches nous n'avons jamais fait œuvre d'imagination. Nous n'avons marché que lentement, sous la pression des observations.

Nous avons ouvert un chemin nouveau, dans laquelle il est maintenant permis de s'engager avec confidence et avec fruit.

Tuberculous Rheumatism and Inflammatory Tuberculosis.—(PONCET.)

Our researches during the past ten years have established the existence of articular and non-articular tuberculous rheumatism. This last comer among the infectious rheumatisms should be placed in the front rank, as it is the most frequent, and its frequency is explained by the frequency of tuberculosis. The various forms of tuberculous rheumatisms range from the acute forms (acute and subacute articular rheumatism) through all the intermediary grades to the chronic forms (nodular, deforming, ankylosing articular rheumatism).

As a rule, the articular lesions do not exhibit the characteristics of classic tuberculosis, such as tubercles, caseous infiltration, etc. (macroscopic features), or tuberculous follicles, giant-cells, etc. (microscopic features), that constitute the characteristic picture to which the term "specific tuberculosis" may properly be applied. The lesions, on the contrary, are made up solely of inflammatory tissue; hence the name "inflammatory tuberculosis," which we have given to this variety of tuberculosis.

There are accordingly two great varieties of tuberculosis: specific tuberculosis, which has been admirably studied and is well known; and inflammatory tuberculosis, with an insignificant anatomic reaction, purely inflammatory, as in all infections and intoxications.

It is this latter form of tuberculosis that we have studied more particularly during the past five years, with our chief of clinic, Dr. René Leriche. It embraces the attenuated forms of tuberculosis which, until that time, had not been properly recognized. Its range is no less extensive than that of virulent specific tuberculosis. It attacks all the tissues, all the systems, all the organs, as well as the joints, where its existence was first revealed to us under the form of tuberculous rheumatism.

Quite often it takes the place of the arthritic, fibrous, or neuro-arthritic diathesis, etc., terms which are becoming more and more vague and less acceptable because they merely refer to syndromes brought about by the

tuberculous virus under a great variety of circumstances (A. Poncet and R. Leriche).

Reumatismo Tuberculose y Tuberculosis Inflamatoria.—(PONCET.)

Nuestras investigaciones, hechas durante los últimos diez años, demuestran la existencia de dos clases de reumatismo articular: el uno de carácter reumático simplemente, y el otro de carácter tuberculoso. En las dos clases el reumatismo articular tuberculoso ocupa el primer lugar por ser, así como la tuberculosis, mas frecuente. Las varias formas de reumatismo tuberculoso pueden presentarse bajo todas sus formas desde la aguda y subaguda hasta la crónica (nodular, deformante, etc.), y todas las formas intermediarias.

Por regla, las lesiones articulares no exhiben los caracteres de la tuberculosis clásica, tales como tubérculos, degeneraciones caseosas, infiltración, etc. (aspecto macroscópico), ó folículos tuberculosos, células gigantes, etc. (aspecto microscópico), que constituye el cuadro característico de la "tuberculosis específica" propiamente dicha. Las lesiones por lo general consisten en la inflamación de los tejidos principalmente, por lo tanto el nombre de "Tuberculosis Inflammatoria" que nosotros hemos dado á esta variedad de la tuberculosis.

De acuerdo con lo expuesto, existen dos grandes variedades de tuberculosis: tuberculosis específica común y admirablemente estudiada y conocida; y tuberculosis inflamatoria, de una reacción anatómica insignificante, puramente inflamatoria como en las otras clases de infección é intoxicacción.

La última forma, principalmente (reumatismo inflamatorio) es la que nosotros hemos estudiado en particular durante los ultimos cinco años con nuestro jefe de clinicas, el Dr. René Leriche. Esta comprende la forma atenuada de la tuberculosis, que hasta entonces no ha sido propiamente reconocida. Su alcance no es menos extenso que el de la tuberculosis específica virulenta. Esta afecta todos los tejidos, todo el sistema, todos los órganos lo mismo que las articulaciones en donde su existencia fué revelada à nosotros bajo la forma de *reumatismo tuberculoso.*

Muchas veces esta toma el caracter de una artritis, fibrosa, ó neuroartritis constitucional, etc., términos que al presente toman un carácter mas y mas vago y son menos aceptables, por que ellos simplemente se refieren a síntomas producidos por una gran variedad ed circunstancias.

TUBERCULOSE-ENCÉPHALITE. PSYCHOSES.

PAR JEAN LÉPINE,
de l'Université de Lyon.

Les troubles psychiques des tuberculeux sont connus depuis longtemps. D'autre part, dans ces dernières ánnées surtout, on a pu mettre en évidence le rôle primordial de la tuberculose à l'origine de diverses formes graves d'aliénation mentale (Démence précoce, Syndrome paralytique, Névrites avec Psychose). Il suffira de rappeler entre autres les noms de Klippel et de Morselli.

Nous désirons attirer l'attention sur des faits moins connus, et qui nous donnent à penser que dans le cours de tuberculoses chroniques et latentes, on peut observer des phénomènes de confusion mentale graves, avec manifestations méningées, éventuelles et inconstantes, et que ces cas peuvent être l'objet d'une cure complète avec guérison durable. Nous avons réuni depuis deux ans, dans le service de la clinique psychiatrique de l'Université de Lyon une série de cas, presque tous chez la femme, et qui après une durée de plusieurs mois, ont guéri les uns et les autres. L'examen des malades nous permet d'éliminer l'hypothèse qu'il s'agisse de manifestations purement névropathiques, hystériques par exemple, qui seraient survenues au cours de la tuberculose.

Il s'agissait bien cliniquement de cas de confusion mentale délirante, avec hallucinations, état de stupeur, et en même temps avec quelques signes méningés. Nous disons qu'il s'agit là d'encéphalites tuberculeuses. La nature tuberculeuse de ces cas nous est montrée par la coexistence de tuberculose viscérale, surtout des poumons, ainsi que par le fait que les réactions de laboratoire se sont montré positives; enfin par l'analogie très grande que présentent ces observations avec celles d'autres malades plus gravement atteints et dont la vérification anatomique à confirmé la nature de la maladie.

Nous devons signaler toutefois qu'il s'agissait de tuberculose discrète ou latente, donnant peu de signes cliniques, et nous admettons que, dans ces conditions, si les malades ont guéri, c'est qu'il s'agissait seulement d'une poussée aiguë de tuberculose septicemique au cours de leur infection chronique. Nous pensons, par la comparaison avec les cas suivis d'autopsie, qu'il s'agit d'encéphalites diffuses avec leptoméningite, et nous pensons

qu'un certain nombre des cas publiés dans ces dernières années sous le nom de méningisme peuvent être rapportés à des accidents de ce genre.

Il est intéressant de signaler que tous ceux de nos malades qui ont guéri ont été traités par des injections de modificateurs énergiques de la phagocytose; en particulier des injections d'argent colloïdal, et des injections de nucléinate de soude. Ces deux agents produisent, comme l'on sait, et comme nous l'avons constaté nous-même, des modifications considérables dans le nombre et la proportion des globules blancs du sang. Nous avons été conduits à leur emploi par le souci que nous avions de provoquer chez nos malades une réaction énergique de l'organisme, et par les bons résultats que divers chirurgiens américains, et M. Chantemesse après eux, avaient obtenu déjà par l'usage des injections de nucléinate de soude dans le traitement de certaines péritonites aiguës.

TUBERCULOSIS IN HOSPITALS FOR THE INSANE IN AMERICA.

By Richard H. Hutchings, M.D.,

Medical Superintendent, St. Lawrence State Hospital, Ogdensburg, New York; Lecturer on Psychiatry, Syracuse University College of Medicine.

The object of this paper is to present in a concise form the present position of American hospitals for the insane with reference to the prevalence of tuberculosis among the inmates, and the measures which have been adopted to control it, together with some suggestions for further limiting the spread of this disease among the insane.

Tuberculosis is one of the chief causes of death in our asylums, and the rate of mortality is higher among the insane than among the population at large. Last year there were 140,343 deaths from all causes in the State of New York, and of this number, 14,027, or 10 per cent., were caused from tuberculosis.*

During the same year the State Commission in Lunacy reported 2071 deaths among the insane in custody in that State, of which not less than 345, or 16⅔ per cent., were attributed to this disease.†

In the State of Massachusetts more than 14 per cent. of the deaths among the inmates of the hospitals for the insane were attributed to tuberculosis.‡

In the Government Hospital for the Insane at Washington, D. C., during the past twenty-one years, 2102 autopsies (representing 60 per cent. of the deaths) showed tuberculosis in active form in 432 cases, or more than 20 per cent., and latent lesions in a still greater number.

In the St. Lawrence State Hospital, Ogdensburg, N. Y., in a series of 828 autopsies, active tuberculosis was met with 119 times, or in 14 per cent. of the cases.

Turning now to the prevalence of the disease among asylum inmates, it will be found from an examination of the reports of the American institutions that there is wide diversity with respect to the prevalence of this disease in the institutions in different sections of the country, as well as the different institutions of the same State. From inquiries made by the writer during

* Annual report of the State Board of Health, 1907.
† Annual report of the New York State Commission in Lunacy, 1907.
‡ Annual report of the State Board of Insanity, 1907.

the present year it was ascertained that there are in the fifteen State hospitals in New York State 28,623 insane patients in custody, and of this number there are no less than 872 in whom a definite diagnosis of tuberculosis has been made.

The following table gives the prevalence of tuberculosis per thousand of the insane in custody in various representative States from which complete information was obtained:

Minnesota	20 per thousand
Massachusetts	23 per thousand
Pennsylvania	23 per thousand
Mississippi	27 per thousand
Iowa	28 per thousand
New York	30 per thousand
Georgia	32 per thousand
Virginia	38 per thousand

In many individual hospitals the ratio is much higher than the maximum given above, but this is due in some cases to the practice prevailing in several States of transferring tuberculous patients to certain of the hospitals where special provision has been made for their care. It was ascertained that in a large hospital in the United States about 30 per cent. of the patients were regarded as tuberculous; and the superintendents of several institutions reported an entire absence of this disease.

In the following State hospitals special provision has been made for the care of tuberculous insane, with the object of removing them from contact with others and providing modern treatment:

Tuscaloosa, Ala	A separate ward for women.
Mendocino, Cal	Tent colony for men.
Patton, Cal	A separate building.
Farmhurst, Del	A separate permanent building.
Washington, D. C. (Government Hospital)	Special wards.
Milledgeville, Ga	Partially in tents and shacks.
Peoria, Ill	Tent colony accommodating 100 patients.
Hospital, Ill	Partially in a temporary structure.
Watertown, Ill	Tents.
Logansport, Ind	Isolation ward for each sex.
Richmond, Ind	Partially in two cottages.
Mt. Pleasant, Ia	Tents.
Topeka, Kansas	Separate building for women.
Jackson, La	Separate building.
Sykesville, Md	Tents.
Catonsville, Md	Tents.
Bangor, Me	Separate building accommodating 44 patients.
Harding, Mass	Separate building for each sex.
State Farm, Mass	Small ward.
Tewksbury, Mass	Partially in shacks.
Hathorne, Mass	Separate building for each sex.
Westborough, Mass	Separate building for each sex.
Traverse City, Mich	Separate building for women.
Kalamazoo, Mich	Separate wards.
St. Peter, Minn	Separate building accommodating 60 patients.

Asylum, P. O., Miss.	Tents.
Willard, N. Y.	Partially in tents; partially in separate buildings.
Poughkeepsie, N. Y.	Separate building for each sex.
Buffalo, N. Y.	Separate building for women.
Binghamton, N. Y.	Pavilion accommodating 100 patients.
Ogdensburg, N. Y.	Pavilion accommodating 100 patients.
Rochester, N. Y.	Separate wards.
Gowanda, N. Y.	Separate wards.
Ward's Island, N. Y.	Pavilions and tents.
Central Islip, N. Y.	Pavilion accommodating 100 patients.
King's Park, N. Y.	Separate building for each sex.
Wernersville, Pa.	Shacks used in summer.
Warren, Pa.	Separate building accommodating 250 patients.
Dixmont, Pa.	Separate building for each sex.
Norristown, Pa.	Separate building for each sex.
Howard, R. I.	Tents.
Petersburg, Va.	Shacks and tents.
Wauwatosa, Wis.	Separate building.
Toronto, Ontario.	Tents.
Kingston, Ontario.	Shacks.
Hamilton, Ontario.	Separate building accommodating 24 patients.
Penetanguishene, Ontario.	Tents.
Quebec, Canada.	Separate building.

The sources from which our institutions recruit tuberculosis are two: (1) The patients who are admitted with the disease, which may or may not be recognized at the time; (2) the cases which develop in the institution. The relative importance of each source is difficult to gage; they doubtless differ in different institutions, depending, on the one hand, upon the communities from which patients are received—whether from the congested districts of large cities or from the rural and farming regions; and, on the other hand, upon the local conditions existing in the hospital, as the presence of overcrowding, the ventilation, and the general standard of care maintained.

At the St. Lawrence State Hospital in 1907, 38 patients were transferred to the pavilion set apart for the treatment of tuberculosis, of whom 15 were recognized as such on admission and 23 had been resident of the hospital for a length of time, as follows:

Less than one year.	7
Between one and five years.	4
More than five years.	12

Where the disease made its appearance during the first year of asylum residence it may have been present and unrecognized at the time of admission. This is probable where the general physical condition was much reduced and the patient did not gain in strength. Where the disease makes its appearance after a year or more of fair physical health, the hospital may fairly be charged with aiding and abetting the disease, if not with originating it. It is impossible, in the majority of insane patients, to diagnose tubercu-

losis in its incipient stages; the nice coöperation on the part of the patient to elicit the crepitant râle can rarely be obtained, and one may be pardoned for failure to discover fairly well-marked foci in many insane persons. It is only when coarse physical signs, as consolidation and bronchial breathing, are present that one can be sure of his diagnosis in many cases. Among the insane the constitutional symptoms have less value than among the sane; fluctuations in weight and temperature, and even sweating, are not conclusive, as they are frequently concomitants of an abnormal condition of the nervous system, and cough is sometimes absent when the disease is well advanced. These facts emphasize the importance of careful observation of newly admitted patients, to the end that the patient himself may receive proper treatment and the health of the household be safeguarded. There are no conditions under which the use of such a diagnostic aid as tuberculin is of greater value than among the insane; and it should be employed in every case where satisfactory physical examination is impracticable at the time of a patient's admission or on any subsequent occasion.

Turning now to the cases which appear to originate in the institution, it is the experience of the writer that there is great diversity in the classes of patients among whom it makes its appearance. At the St. Lawrence State Hospital there are two detached cottages, accommodating each 70 men patients, who are regularly employed at farm and garden work, and during the past fifteen years no case of tuberculosis has occurred in either cottage. In some other wards one or more cases have developed nearly every year. Those wards in which it is most frequently found are occupied by the demented and untidy classes and the so-called disturbed. These are the wards in large public hospitals which tend to become overcrowded even when in the institution as a whole the overcrowding is not great. This is due in part to the desire of the officers to remove objectionable patients from the better wards, thereby rendering them more attractive to the intelligent patients, and partly for the reason that individuals of this class cannot take part in occupations which would remove them from the ward during the working hours, and many on account of their physical condition cannot even be taken out for exercise, hence they lead a comparatively inactive and an indoor life. The mere fact that the ward is crowded renders rather urgent the necessity of keeping people in their places; the requirements of good order are too frequently construed by nurses and attendants as having patients seated in their places and to discourage all activity. Those patients who can be employed, and who, therefore, are off the ward a portion or the greater part of each day, unless crowded in sewing-rooms and shops, are usually in a healthier condition and freer from tuberculosis than those remaining on the wards. As most institutions for the insane have farms or large gardens where patients may be employed, it is comparatively

easy to find suitable employment out of doors for men, and difficult to provide work for women, except housework and indoor occupations, as sewing, rug-making, chair-caning, and other more or less sedentary tasks. Let us see how the prevalence of tuberculosis differs in the two sexes, bearing in mind this well-recognized difference in the employment and modes of life of our hospital inmates. In the period 1888 to 1906, according to the report of the New York State Commission in Lunacy, there were 28,106 deaths from all causes in the New York State hospitals for the insane. Of these, 15,242 were men and 12,864 were women. Among the men, 1463 died from tuberculosis (9.5 per cent.), while among the women there were 2596 deaths from tuberculosis, which is 20.1 per cent.—more than twice the death-rate among the men from this cause. The death-rate among the men in State hospitals is slightly less than that of the State at large; among the women it is more than twice as high as that of the State at large; and, what is more significant, more than twice that of the men in the same institutions. Inquiries made in other States show that the conditions are virtually the same throughout the United States. In almost every State in the Union the number of cases of this disease among the women greatly exceed those among men.

The following table shows the form of insanity of the 119 cases in which active tuberculosis was found post mortem in a series of 828 autopsies at the St. Lawrence State Hospital:

Terminal dementia	51
Chronic mania	11
Chronic melancholia	12
Senile insanity	11
Epilepsy	9
Acute melancholia	7
General paralysis	8
Acute mania	3
Imbecility	3
Organic dementia	1
Paranoia	1
Miscellaneous	2

In the above series of 828 autopsies, 447 were on men and 381 on women. Among the women active tuberculosis was found 62 times, or 16.2 per cent.; and among the men 57 times, or 12.7 per cent.

There are a few large public hospitals for the insane in the United States in which the disease is almost if not wholly unknown. I refer to the State Hospital at Provo City, Utah. The superintendent, Dr. Calder, informs me that there is not now, nor has there been for the past five years, a single case of tuberculosis among the 353 inmates. Practically the same may be said of the Territorial Asylum at Reno, Nevada, where the disease is unknown, except for an occasional patient admitted with it, and there have been no deaths from it for several years past. It is interesting in this connection to notice that the altitude of these institutions is 4560 and 4500 feet

respectively above the sea-level, but Dr. Calder adds another significant remark when he says: "In this latitude we are able to have all of our patients, except now and then a bed patient, out-of-doors a part of each day, almost all of the year. During the spring, summer, and fall they spend on an average five hours each day in the open air."

Prevention of Tuberculosis.—It is now generally recognized that among the insane, as elsewhere, tuberculous patients should be removed from contact with the healthy, and afforded the treatment which can only be given in special structures of one sort or another, as pavilions, tents, and sheltered porches. To this end no patient should be admitted to the general wards of an institution until the presence of the disease has been excluded. Overcrowding in wards and dormitories should be avoided, and particularly those departments occupied by the demented and inactive classes. The writer realizes fully the difficulty in accomplishing this very evident precaution, but believes that when we can go to the legislature with stronger objections to overcrowding than mere difficulties of administration, we will be more likely to obtain the relief which we seek. All patients physically able should be exercised, and when possible employed, in the open air daily. When patients are in the wards, they should be warmly dressed and fresh air should be admitted through open windows in such quantities as to effectually do away with any suggestion of foul air in the rooms. The clothing worn by one patient should not be used by another until it has been sterilized. The danger here is particularly in the use of shawls, hoods, and wraps for the neck. The same rule should apply to the use of blankets and bed-linen. Care should be exercised that infection is not conveyed through cups for drinking-water. The wards for women as well as for men should be supplied with cuspidors of appropriate type and the patients taught to use them.

It is worthy of remark that those institutions which have provided separate pavilions or have adopted the use of tents have almost uniformly reported a decrease in the prevalence of tuberculosis in the institutions. Some of my correspondents have characterized it as a remarkable decrease. I have no figures to present except the result of the work of the tuberculosis pavilion at Ogdensburg, which to us have been extremely gratifying. During the first year of its operation four of the patients were discharged from custody, apparently cured of tuberculosis, and three of them recovered of insanity, and the fourth much improved. Fourteen others improved to such a degree that all active symptoms departed, and physical examination was either negative or showed only diminished resonance over the affected area. During the second year nine of the patients were discharged from the pavilion to other wards of the hospital as not requiring further treatment, and five others were returned to their homes in a condition to resume their

occupations. During the second year the number of deaths declined from 34 to 19, the lowest in seven years, and tuberculosis, which has heretofore occupied first place in the causes of mortality, has been reduced to fourth.

Sur la Tuberculose, dans les Asiles d'Aliénés.—(HUTCHINGS.)

Cette communication présente un résumé sur le sujet de la tuberculose dans les asiles d'aliénés américains, comprenant un rapport des mesures employées actuellement pour diminuer la fréquence de la maladie et des propositions pour l'enrayer encore davantage.

Des comptes rendus de l'État de New York montrent que la mortalité causée par la tuberculose s'élève à 16.6% pour les aliénés vivant dans les asiles, et à 10%, pour l'ensemble de la population en général. Dans l'État de Massachusetts, plus de 14% des morts, parmi les aliénés, sont attribuées à cette maladie; à l'hôpital pour aliénés du gouvernement, l'autopsie a révélé plus de 20% de lésions tuberculeuses, dans l'hôpital de St. Lawrence, de l'État, des lésions tuberculeuses actives ont été trouvées par l'autopsie, dans 14% des cas. La fréquence de la maladie parmi les habitants des asiles varie suivant les différentes parties du pays, étant plus fréquente en termes généraux, dans l'Est et moins fréquente dans les pays nouveaux de l'Ouest; cela dépend, jusqu'à un certain point:

1. De l'entourage du malade admis, s'il vient d'une ville surpeuplée ou d'une région rurale.

2. Des conditions existant dans l'hôpital même, encombrement, mauvaise ventilation et de l'ensemble des soins donnés.

Un examen des cas de mortalité par tuberculose dans les deux sexes a révélé que, parmi les différentes classes d'aliénés, la tuberculose est plus fréquente chez les oisifs, les inactifs, chez ceux qui mènent une vie renfermée, et moins fréquente chez les malades qui travaillent d'habitude en plein air. Dans nos asiles, les femmes, en général, sont employées à des travaux domestiques et d'intérieur, tandis que les hommes sont occupés au dehors, dans les jardins et dans les fermes.

Pendant ces 18 dernières années, il y a eu, parmi les aliénés hospitalisés, 28,106 morts de causes différentes, dont 15,242 hommes et 12,864 femmes. Tandis que 1,463 ou 9.5% des hommes sont morts de la tuberculose, la mortalité pour les femmes, pour la même maladie, s'est élevée à 2,596 ou plus de 20%. Le nombre d'aliénés chez lesquels un véritable diagnostic de tuberculose a été fait, varie, dans les différents asiles américains, entre 0 et 14%, la moyenne étant d'environ 3%. Il y a tout lieu de croire que ces chiffres sont au-dessous de la vérité, vu la difficulté qu'il y a de faire un examen physique.

Il y a une diminution dans la fréquence de la maladie là où des mesures sont prises pour isoler les malades tuberculeux.

Les mesures de prévention contre la tuberculose comprennent, en dehors des mesures ordinaires de propreté, un examen plus sérieux des nouveaux malades; l'emploi de la tuberculine chaque fois que le cas l'exige, avec isolation de toute personne infectée; éviter l'encombrement dans les salles et les dortoirs; établir une grande ventilation par les portes et fenêtres ouvertes; des exercices journaliers et des travaux en plein air pour les hommes et pour les femmes; la stérilisation de tout vêtement et de la literie avant de les employer pour une autre personne.

Tuberkulose in Irrenanstalten.—(HUTCHINGS.)

Dieser Artikel bietet ein Résumé über den Gegenstand der Tuberkulose in amerikanischen Irrenanstalten, einschliesslich einer Feststellung der Massnahmen, die jetzt angewendet werden, um die Krankheit zu vermindern, mit Vorschlägen für weitere Einschränkungen.

Berichte vom Staate New York zeigen, dass die Sterblichkeit an Tuberkulose unter den Anstaltsirrsinnigen 16.6% ist, während sie unter der allgemeinen Bevölkerung nur 10% ist; in Massachusetts werden mehr als 14% der Todesfälle unter den Irrsinnigen dieser Krankheit zugeschrieben; das Government Hospital for the Insane berichtet mehr als 20% tuberkulöse bei Sektionen gefundene Affektionen; in dem St. Lawrence State Hospital sind in 14% der Fälle aktive tuberkulöse Affektionen post mortem gefunden worden. Die Häufigkeit der Krankheit unter den Anstaltspfleglingen schwankt in den verschiedenen Teilen des Landes; sie ist grösser, im ganzen genommen, im Osten und kleiner in den neueren Staaten des Westens. Dies hängt zu einem gewissen Grade ab (1) von der Umgebung des zugelassenen Patienten—ob er aus einer übervölkerten Stadt oder vom Land kommt; (2) von den Verhältnissen im Spital—Überfüllung, schlechte Ventilation und mangelhafte Krankenpflege.

Häufigkeit der Tuberkulose unter den verschiedenen Klassen der Irrsinnigen:—Am grössten unter den Arbeitslosen und Unbeschäftigten und unter denen, die in geschlossenen Räumen arbeiten; am geringsten unter den Kranken, die regelmässig im Freien beschäftigt sind, bestätigt durch eine Prüfung der Sterblichkeitsziffern dieser Krankheit in den beiden Geschlechtern. In unseren Anstalten werden die Frauen gewöhnlich innerhalb des Hauses mit häuslicher Arbeit beschäftigt, während alle Arbeiten im Garten und Felde und sonst im Freien von Männern verrichtet werden. Im Staate New York sind während der letzten 18 Jahre unter den Anstaltsirrsinnigen 28,106 Todesfälle von allen Ursachen vorgekommen. Von diesen waren 15,242 Männer und 12,864 Frauen. Unter den Männern starben 1,463 oder

9.5% an Tuberkulose; während unter den Frauen 2,596, oder mehr als 20%, Todesfälle dieser Krankheit zuzuschreiben sind. Die Anzahl der Irrsinnigen, an denen Tuberkulose wirklich diagnostiziert wird, schwankt in den verschiedenen amerikanischen Anstalten von 0 bis 14%; der Durchschnitt ist ungefähr 3%. Diese Zahlen sind wahrscheinlich nicht massgebend, weil die physikalischen Untersuchungen schwer zu machen sind.

Da wo Massregeln angewendet werden, um die Tuberkulösen zu isolieren, hat man einen Erfolg in der Verringerung gehabt. Massnahmen, die Schwindsucht zu verhindern, sind, ausser den gewöhnlichen Reinlichkeits-Massnahmen, eine mehr kritische Untersuchung der Patienten, eventuell die Anwendung von Tuberkulin mit Isolierung aller Angesteckten, Einschränkung von Ueberfüllung in Kranken- und Schlafsälen, freie Ventilierung durch offene Türen und Fenster, tägliche Bewegung und Beschäftigung im Freien für Männer sowohl als Frauen, und Desinfizierung aller Kleidungsstücke und Betten, bevor solche von einer anderen Person gebraucht werden.

DISCUSSION.

Dr. Joshua W. Hering (Westminster, Md.): In connection with this interesting discussion I wish to say a word in relation to the tuberculosis record at the Springfield State Hospital for the Insane, located at Sykesville, Maryland, of whose board of managers I am a member.

This institution opened its doors for the reception of patients in 1897. Since that time it has received and cared for between 1700 and 1800, and has now about 840.

Four hundred and three deaths from all causes have occurred since the opening of the hospital, and of this number, 30 have been from tuberculosis, which is equivalent to about 7.7 per cent.

This hospital has, from the beginning, been conducted upon the "open-door" principle, and it is believed by the superintendent and his medical assistants that the remarkably low death-rate from tuberculosis is attributable to this fact. These patients are kept as much as possible in the open air, and are given such light outdoor employment as their physical condition will permit. While the "open-door" system at this State hospital for the insane was not, in the beginning, adopted with a view to its effect upon tuberculosis patients, it has, nevertheless, we think, been the means of working out this most gratifying result.

I simply arose, Mr. President, for the purpose of calling the attention of the conference to these facts, and thank you for having given me the opportunity to do so.

LE RÔLE DES ADHÉRENCES PLEURALES DAN LES MORTS SUBITES. DANS LES ASPHYXIES ET DANS LES GRANDS TRAUMATISMES CHIRURGICAUX.

Par Drs. Lacassagne et Etienne Martin,
Professeurs de Médicine légale, à l'université de Lyon.

Des travaux importants ont été entrepris sur ce sujet au laboratoire de Médicine légale de l'Université de Lyon sous la direction du Professeur Lacassagne.* Les adhérences pleurales constituent une lésion d'une extrême fréquence. Elles sont la conséquence et la séquelle des inflammations pleurales consécutives aux lésions pulmonaires ou aux pleurésies sèches ou avec exsudat.

Chez les individus qui meurent de mort subite, on les trouve dans la proportion de 80 pour cent. Chez les vieillards, Louis les a rencontrées 33 fois sur 57 autopsies. Elles sont localisées en etendues faibles ou fortes, très fréquemment bilatérales. A leur complet développement, il existe une symphyse pleurale très difficile à diagnostiquer cliniquement, et cependant, elles troublent le mécanisme physiologique de la respiration en agravant des troubles respiratoires d'ordre accidentel et en favorisant les tendances congestives des poumons.

Aussi sont elles l'une des grandes causes de la mort subite. *Tout individu porteur d'adhérences pleurales étendues est un candidat à la mort subite.* (Lacassagne.) Qu'il survienne chez ces sujets un surmenage, une fatigue, une marche forcée, elles occasionnent des accidents foudroyants. (Coup de chaleur, Kelsch.) Elles favorisent singulièrement l'asphyxie sous toutes ses formes (submersion, strangulation, suffocation). Tout individu porteur d'adhérences pleurales, qui vient à tomber à l'eau est un homme mort (Lacassagne). Cette influence néfaste des adhérences pleurales a été notée aussi dans l'intoxication oxycarbonée. Les sujets qui en sont atteints sont beaucoup moins résistants à l'intoxication. Leur constatation peut avoir une importance dans la discussion des questions de survie.

Dans l'anesthésie chirurgicale, elles peuvent être une cause de mort subite. Par leur influence nuisible sur la petite circulation, oedèmes, cyanose, congestion, dyspnée, elles sont une cause fréquente de syncopes toujours

* Thèses de Legros, Lyon, 1894; de Combes, Lyon, 1897; de Louis, Lyon, 1901. Précis de Médecine légale du Professeur Lacassagne.

rapidement mortelles. La mort serait due à un véritable phénomène d'inhibition à point de départ pleural.

Je signale également leur importance dans la mort rapide consécutive aux grands chocs chirurgicaux. J'ai fait dernièrement l'autopsie d'un individu qui à la suite d'un coup de feu dans l'abdomen avait subi une éviscération complète avec résection de 50 centimètres de l'intestin grêle pour perforation intestinale. La mort est survenue rapidement 7 jours après l'intervention chirurgicale. A l'autopsie nous avons trouvé des adhérences pleurales très étendues des deux poumons chez un individu jeune à l'apparence athlétique et de l'oedème aigu du poumon qui avait déterminé une asphyxie rapide.

En résumé, des adhérences pleurales ne doivent pas être considerées en médecine légale comme une simple trouvaille d'autopsie. Elles sont un point de moindre résistance pour l'organisme le plus florissant, le lieu d'appel pour la congestion pulmonaire ou la localisation de l'oedème. Elles constituent une infirmité parfois redoutable dans ses conséquences. (Mort subite moindre résistance au traumatismes et aux différents genres d'asphyxie.)

The Rôle of Pleural Adhesions in Sudden Death, Asphyxia, Severe Injuries.—(Lacassagne and Martin.)

We consider that pleural adhesions occur in 80 per cent. of cases. They are most frequently of tuberculous origin. Every individual with pleural adhesions is liable to sudden death. Every patient with adhesions falling in water is a doomed man (Lacassagne). Adhesions may aid rapid death in anesthesia or after severe surgical injuries.

Their importance is therefore very great in general medicine and in legal medicine.

They are the more injurious as they are more extensive.

El Papel de la Adhesión de la Pleura en la Muerte Repentina. Asfixia, Lesiones Graves.—(Lacassagne y Martin.)

Nosotros concideramos que la adhesión de la pleura ocurre en 80% de los casos. Ellas son por lo general de origen tuberculosa. Cada individuo con adhesión de la pleura esta expuesto a la muerte repentina. Cada paciente con adhesión de la pleura al caer al agua es un hombre sentenciado (Lacassagne). La adhesión predispone a la muerte repentina en la anestesia y en las lasiones quirúrgicas graves.

La importancia de esta es por lo tanto en la medicina en general y en la medicina forence.

La adhesiones son tanto mas graves cuanto estas son mas extensas.

SANATORIUM D'HÔPITAL. (AERIUM.)

Par M. Raoul Brunon,
Professeur de Pathologie interne à l'Ecole de Médecin de Rouen.

Il y a quelques années, une grande agitation était faite dans le corps médical en faveur des sanatoriums pour tuberculeux. On voulait que le sanatorium fût l'instrument principal et presque unique du traitement. Tous les partisans le consideraient comme devant être un organisme autonome représentant le meilleur mode d'isolement des malades.

Par autonomie, on entendait une vaste organisation permettant, non seulement la cure d'air, mais exigeant encore les services de désinfection, les appareils de chauffage et d'hydrothérapie les plus perfectionnés. L'Allemagne, qui poussait fort à ce mouvement, avait donné l'exemple avec ses immenses sanatoriums, et, en particulier, avec le sanatorium de Beelitz, près Berlin, qui avait conté onze millions de francs.

A toutes les époques, les médecins dans leur vif désir de donner de la précision à un art conjectural qui n'en comporte guère, se sont jetés dans les théories du moment. Et la force de l'agitation en faveur des sanatoriums était telle que les préoccupations des dépenses à faire n'entraient pas en ligne de compte dans les esprits.

En théorie, il était séduisant d'aller dépister le malade, de l'installer confortablement dans un hôpital spécialement aménagé pour lui et de l'isoler suivant les règles. En théorie, les résultats devaient être merveilleux. Dans la pratique, ils furent toujours médiocres et jamais en rapport avec les énormes sacrifices. En France, ce furent Rouen, Bordeaux et Lille qui cherchèrent à repandre l'idée qu'on faisait fausse route.

Une des préoccupations des partisans du sanatorium était d'isoler le tuberculeux, considéré comme une source de danger pour les autres. Il nous a toujours paru que l'isolement des tuberculeux n'avaient pas besoin d'être très sévère; qu'on abusait de l'idée dogmatique de contagion; que cette contagion était bien loin d'avoir le caractère de fatalité qu'on voulait lui donner et, qu'en résumé on obéissait trop en phthisiologie à des idées théoriques. Nous avons toujours pensé que la contagion tuberculeuse est facile à éviter et que, dans tous les cas, le clinicien a tout avantage à s'en tenir à un pragmatisme prudent, quoique aussi éclairé que possible.

Tout en admettant qu'on a abusé et qu'on abuse de la notion, vraie en

soi, de contagion, il faut bien reconnaitre que tout ce que nous rejetons au dehors est nuisible à l'économie. Nous avons le devoir de nous prémunir contre l'action nocive des excreta de toute sorte. Aussi de la lutte contre la tuberculose, par les sanatoria, est sorti un principe excellent qui tend à dominer toute la thérapeutique moderne: l'aération constante et l'antiseptic sont les bases de tout traitement de la tuberculose.

Nous avons pensé que l'application de ces principes peut se faire sans se lancer dans les dépenses formidables qu'exige la construction et l'agencement d'un sanatorium.*

De là l'idée de soigner les tuberculeux à l'hôpital dans un sanatorium de fortune. Idée paradoxale aux yeux des sanatoriaux, et cependant pleine de résultats pratique, comme nous pourrons le démontrer par des faits. De là l'idée d'organiser dans l'hôpital même la cure d'air.

Notre installation pour le service des enfants de l'Hospice Général de Rouen est une sorte de petit sanatorium improvisé dans l'hôpital. C'est la cure d'air organisée à l'hôpital; c'est l'aérium.

Il est vrai que cette organisation ne peut pas appliquer l'isolement dans le vrai sens du mot: mais les événements nous ont prouvé qu'une discipline sévère peut la remplacer. Et ne peut-on pas admettre qu'il est peu nécessaire parce qu'il sera toujours illusoire, quoi qu'on fasse?

Pous réaliser notre idée, deux mesures capitales devaient d'abord être prises:

1° Installer les malades en plein air pendant le jour.

2° Stériliser les dortoirs et tout le milieu nosocomial, comme le chirurgien stérilise le champ opératoire.

Stérilisation des Salles Communes.

On commença par la suppression radicale de tous les rideaux: rideaux de lit et rideaux de fenêtres. Les parquets furent lavés tous les jours; de même pour le mobilier. On supprima dans les salles tous les vêtements et tous les menus objets que les malades ont l'habitude de conserver avec eux. La planchette des lits et des tables de nuit furent surveillées avec soin à ce propos.

Lee malades eux-mêmes furent lavés tous les jours par des lotions chaudes et savonneuses ou par le grand bain de baignoire. Le personnel reçut un costume spécial fait de toile blanche lavable et dont la propreté est facile à surveiller.

Des lavabos roulants furent installés dans les salles avec eau chaude parfumée, savon et brosses. Les malades et le personnel reçurent l'ordre de se servoir de ces lavabos le plus souvent possible.

* Pour hospitaliser tous les tuberculeux indigents de France, deux milliards de francs auraient à peine suffi.

Les médecins de ma génération ont conservé le souvenir de l'unique pot-à-l'eau et l'unique curette destinés au chef de service seul quand il se lavait les mains à la fin de la visite. Il en est encore de même dans nombre de grands hôpitaux d'Europe.

Des précautions particulières furent prises pour la propreté de la bouche des malades: chaque malade eut sa brosse à dents avec poudre de craie et eau tiède.

Mais le mesure d'antiseptie la plus efficace est celle qui utilise les agents physiques naturellement microbicides: l'air et la lumière. L'aération des salles communes se fit par la fenêtre ouverte nuit et jour, quel que soit le temps, quelle que soit la température ou la saison.

Installation des Malades dans les Salles.

Dans le jardin potager de l'hôpital, qui est vaste, on construisit deux baraquements en bois, un pour les garçons, et un pour les filles.

Dans ces baraquements on mit des brancards de bois avec matelas et couvertures, et ce fut tout.

Dans cette installation, les enfants prisent place de 8 hres du matin à 4 hres en hiver, à 6 ou 7 hres en été; les uns avec ordre de rester au repos et étendus, les autres avec permission de jouer ensemble suivant les cas.

Au costume habituel des enfants, on ajouta une pélerine à capuchon et des gants de laine pendant l'hiver, un chapeau de paille pendant l'été. On ne tarda pas à voir que les froids assez rigoureux sont facilement supportés, grace à une accoutumance très rapide. Ce sont eux qui donnent les meilleurs résultats. Le chaud, au contraire, est mal supporté, et pendant les chaleurs de l'été, l'appétit des malades diminu.

Pas de suralimentation. Quelquefois de la viande crue, le plus souvent quelques suppléments appétissants, tels que les hors-d'oeuvre ou les entremets sucrés. Pour boisson, de l'eau ordinaire.

Les enfants passant le jour dans les baraquements hors de la salle, il en résulte que cette dernière est vide toute la journée. Elle ne reprend ses pensionnaires que pendant la nuit. Les grands malades fébriles sont donc seuls dans les salles pendant le jour: de là un bénéfice considérable pour eux.

L'ensemble de cette organisation permet d'utiliser au profit du sanatorium les grands services de l'Hospice Général: la cuisine, les bains, la buanderie, les étuves à désinfection. Enfin il n'est pas nécessaire d'avoir un personnel spécial pour le sanatorium.

Le grand principe mis en pratique est le suivant: les enfants passant la journée au plein air et pendant la nuit ils ne sont jamais dans un air confiné.

Résultats.

1° Au point de vue prophylactique, notre organisation réduit au minimum les chances de contagion.

Pratiquement, nous la supprimons. Il est impossible de faire la preuve de cette assertion pour la tuberculose, à cause de la lenteur de sa marche et de la longue période de germination. Mais la preuve indirecte est dans la constatation du fait suivant: dans l'espace de huit ans, je n'ai jamais vu ni un cas de broncho-pneumonie ni un cas de coqueluche naitre dans le service malgré le grand nombre des malades qui y entrent atteints de ces affections.

2° Au point de vue curatif, les résultats dépassent ce qu'on aurait pu espèrer.

Dès les premières semaines de sejours à l'aérium, on note chez les petits malades:

L'atténuation de la toux et la diminution de l'expectoration. Ces deux phénomènes ont été remarquable chez quelques enfants de 14 à 16 ans.

Le retour de l'appétit et parallèment une augmentation de poids incroyable chez quelques uns. J'ai vu des enfants entrer dans un état voisin de la cachexie et augmenter de dix kilos en dix mois.

La disparition de la pâleur et le reprise d'un facies rosé, gai et animé sont frappantes.

Le retour de la gaieté, le désir d'aller à l'aérium, l'accoutumance au froid. Dans les journées les plus froides, la température peut descendre à moins douze degrés centigrades à l'aérium et à moins cinq degrés dans les salles pendant la nuit. Les enfants ne sont pas sensibles à ces abaissements de température. Rien ne peut diminuer leur désir d'aller au jardin. Les grandes chaleurs, nous l'avons dit, sont mal supportés pendant les mois de Juillet et d'Août, et le poids des enfants diminue.

D'une manière générale, on peut dire qu'à la période de germination (première période de Grancher) les résultats sont très bons. Leur constatation est devenue banale pour les élèves du service.

A la période d'induration (première période de Laënnec) ils sont encore très bons quand les enfants n'ont pas d'accidents intestinaux.

Les résultats sont encore assez bons à la période de ramollissement avec catarrhe bronchique et fièvre.

La vitalité est tellement grande chez certains enfants que, dans quelques cas désespérés en apparence, nous avons vu les forces se relever et le malade être mis sur la voie de la guérison.

Rien n'est plus difficile que le pronostic de la tuberculose et le mot de notre confrère Janicot est vrai: "ça guérit quand ça veut."

Il ne faut pas compter moins de deux à trois ans pour amener le cas le plus favorable au seuil de la guérison. Nous avons eu une centaine de malades dans ce cas et il s'agissait d'enfants agés de 6 à 16 ans.

LE SANATORIUM DE LA FORÊT DU ROUVRAY.

PAR DR. A. GIRAUD,
Rouen, Président de l'oeuvre du Sanatorium Rouennais,

ET DR. COTONI,
Rouen, Médecine Directeur du Sanatorium de la Forêt du Rouvray à Oissel.

Nous présentons sous ce titre une simple notice sur un sanatorium créé dans ces dernières années, à proximité de la ville de Rouen. C'est une oeuvre d'initiative privée dont les frais d'installation ont été couverts par une souscription publique ouverte en l'année 1900.

La Société Normande d'hygiène pratique avait crée par des conférences un mouvement en faveur de la lutte contre la tuberculose, et la souscription fut organisée par une association ayant pris le titre "Oeuvre du Sanatorium Rouennais." Le programme de cette association était d'installer un établissement où l'on put soigner des tuberculeux n'ayant pas de ressources suffisantes pour se faire traiter au loin, aucun sanatorium n'existant aux environs de Rouen. Le nouvel établissement devait être, en même temps, une sorte d'école pour apprendre aux malades à se soigner d'une manière rationnelle, sans être une cause de danger pour leur entourage. Les difficultés rencontrées, tout pour l'acquisition d'un terrain favorable au but chercher, que pour l'organisation d'un établissement hospitalier indépendant de l'assistance publique sont sans intérêt pour le Congrès. Comme les ressources étaient limitées, on décida de construire, pour le début de l'oeuvre, un bâtiment à simple rez de chaussée, et de ne recevoir qu'un seul sexe, des femmes, en attendant que de nouvelles ressources permissent d'étendre la construction. Le sanatorium a été ouvert le 10 Aout 1905. Il avait dix lits qui ont été, au bout de quelques mois portés à quatorze.

Il est situé à dix kilomètres au sud de Rouen, et on y accède par la Station de chemin de fer de Oissel. Il est à la lisière d'une grande forêt domaniale de puis, sur une pente douce, à une altitude de quarante cinq mètres environ au dessus de niveau de la Seine, dont il est éloigné d'environ deux kilomètres. Il est exposé au midi, et par suite de la disposition de la forêt, est complétement abrite des vents du Nord, de l'Est et de l'Ouest. La construction est très simple. Le rez de chaussée est bâti, sur caves, en briques et ciment armé. Les chambres des malades sont au midi et s'ouvrent sur une large

galerie de cure. Les pièces ont pour sol du porphyrolite, et les murs sont revêtus de peinture vermissée pour permettre le lavage. Le chauffage est assuré par un calorifère à vapeur à basse pression.

Le mode de traitement est la cure d'air et de repos. L'aération des chambres est permanente, les fenêtres ouvertes constamment sauf pendant le lever et le coucher des malades. Une disposition particulière des persiennes des fenêtres permet de régulariser l'aération sans que les malades puissent être incommodés par les coups de vent. Il est expressement interdit, sous peine de renvoir, de cracher ailleurs que dans les crachoirs mis à la disposition des malades, individuellement et collectivement. A l'extérieur de la maison, il est interdit, sous la même peine de cracher par terre.

Voici l'horaire de la journée:

7 heures ½; Lever, toilette.
8 heures; Petit déjeuner à la salle à manger, puis, promenade ou petits travaux manuels.
9 heures; Cure de galerie.
10 heures; Tasse de lait, puis promenade et reprise de la cure de galerie.
Midi, diner.
1 heure à 3 heures; cure de galerie.
3 heures à cinq heures; Travaux manuels.
4 heures; Gouter.
5 heures à 6 h. ½; cure de galerie.
7 heures; Souper.
8 heures; Coucher.

La composition des repas est la suivante:

8 heures; Petit déjeuner; lait, café ou chocolat avec pain et beurre.
10 heures; Tasse de lait, froid ou chaud.
Midi; Diner (repas principal). (1) Oeufs; (2) plat de viande; (3) légumes servis soit à part soit avec le plat de viande (lentilles, haricots, riz, pommes de terre en purée); (4) fromage ou fruits ou confiture; (5) entremets le Dimanche et les jours feriés; boisson: vin, 20 centilitres, ou lait ½ litre, ou cidre ½ litre.
4 heures: Gouter, lait sucré.
7 heures: Souper: (1) potage gras ou maigre; (2) plat de viande; (3) légumes, servis à part de préférence; (4) fromage ou fruits, ou confiture; boisson comme au diner.

Les résultats obtenus au Sanatorium de la Forêt du Rouvray ont été, dès le début, très satisfaisants, et toutes les fois qu'on n'a pas admis des malades à une période trop avancée, on a vu les malades présenter une amélioration rapide et notable. Les malades reprennent des forces, augmentent de poids, respirent plus facilement; l'expectoration diminue. Les signes

stéthoscopiques s'attenuent. Ce qui est intéressant à noter, c'est qu'à leur sortie du sanatorium, les malades réellement améliorées (le sanatorium n'a rien jusqu'à présent que des femmes), n'ont pas de rechute et peuvent reprendre leur travail. Les malades sont, pour la plupart, revues après leur sortie du sanatorium et ne sont pas perdues de vue. On observe ce qu'on peut appeler des guérisons, confirmées depuis plusieurs années, pour des malades entrées au début de l'organisation du sanatorium.

On pouvait craindre que la faible altitude de l'établissement et son installation sous un climat brumeux ne fut un obstacle à la cure. L'expérience montre que cette crainte n'était pas fondée et qu'on peut obtenir aux environs de Rouen les mieux résultats que dans un sanatorium d'altitude. Ce point est intéressant à constater. Le Sanatorium de la forêt du Rouvray est un sanatorium populaire. Le prix de journée est de trois francs cinquante, et ce prix est abaissé à deux francs cinquante, pour les indigents au compte de l'Assistance Médicale, sans qu'aucune distinction soit faite, au point de vue de la nourriture ou du logement entre les malades de l'Assistance Médicale et les autres. Les malades qui entrent au sanatorium de la Forêt du Rouvray n'auraient pas les moyens d'aller se faire soigner dans un sanatorium d'altitude et les faits sont là pour montrer qu'on peut leur donner les mêmes soins sur place, ou, du moins, à proximité de leur résidence, et sans s'écarter de la région.

Le sanatorium étant construit à la lisière d'une forêt de pins est naturellement isolé. L'habitation la plus voisine est une maison de garde forestier à un demikilomètre de là. Les malades supportent très bien cet isolement qui est nécessaire pour éviter toutes les causes de contamination de l'air. Il faut dire que la galerie de cure domine la vallée de la Seine, et qu'on y joint d'une vue étendue. L'établissement est dans un joli site, et les malades ne s'y sentent pas dans la solitude parce qu'on devine au loin le mouvement des environs d'une grande ville.

Le sanatorium de la Forêt du Rouvray a le défaut d'être trop petit pour répondre à toutes les demandes d'admission qui sont addressées. On travaille, en ce moment même, à l'accroître.

L'AVENIR DU SANATORIUM POPULAIRE.

SON RECRUTEMENT—SON ORGANISATION—SES RÉSULTATS.

Par Dr. F. Dumarest,

Médecin-Chef du Sanatorium F Mangini à Hauteville (Ain).

Le Sanatorium populaire vivra. L'écho des dicussions passionnées qui ont entouré son berceau, dans notre pays, s'est eteint et l'apaisement s'est fait dans cet éclectisme qui est l'aboutissant naturel de tous les differends humains et qui, faisant leur part et leur mesure à toutes les verités, vient toujours, en dernière analyse, apposer le sceau de la justice sur nos enthousiasmes, nos dénigrements et nos divergences.

Le sanatorium populaire vivra donc, parce qu'il a fait la preuve de son utilité et qu'il represente une idée juste, mais que sera-t'il? On peut, du passé, augurer l'avenir et c'est de l'experience d'un de nos plus anciens sanatoriums français que nous voudrions essayer de tirer quelques indications générales sur ce qu'il doit être, sur ce qu'il sera.

Dès maintenant il apparait qu'une des principales difficultés du fonctionnement des Sanatoriums populaires réside dans leur recrutement. Un Sanatorium en effet n'est pas un hôpital et son objectif ne doit pas être l'assistance, mais bien le rendement social: il lui importe donc essentiellement de n'admettre que des malades susceptible ou de guérison ou d'amélioration sérieuse et durable, compatible avec le reprise de la vie sociale et de l'activité laborieuse. C'est evident, mais ce n'est pas facile. D'une part les malades, surtout dans le peuple, ont une tendance commune à traiter par le mépris une maladie dont ils ne souffrent pas, qui ne devient gênante et n'entrave l'activité le plus souvent qu'au moment ou elle est déjà incurable et dont la gravité n'est pas manifeste, aux yeux de tous, pendant les périodes initiales. Ce n'est pas tout: l'ouvrier jeune est insouciant; plus rassis, chef de famille, est-il décidé à faire les sacrifices nécessaires pour ce traiter opportunément qu'il s'en trouve souvent empêché, par la nécessité immédiate d'assurer, par son travail journalier, la subsistance des siens. Aussi les conseils des médecins à cet égard sont-ils rarement écoutés. Faut-il avouer que ces conseils eux-mêmes ne sont pas toujours donnés avec assez d'insistance au moment utile et que, l'experience nous le montre trop souvent pour nous puissions le dissimuler, malade et médecin ne se trouvent d'ac-

cord pour solliciter l'admission au Sanatoriums qu'au moment où elle est devenu inutile, l'un parce qu'alors, devenu incapable de travail, il a besoin d'être hospitalisé, l'autre parce que, ayant épuisé toute sa thérapeutique et d'ailleurs peu convaincu de l'efficacité de la cure sanatoriale (la campagne injuste et excessive menée contre le Sanatorium a bien quelque responsabilité dans cet état d'esprit, trop fréquent dans le corps médical) il n'y voit que le moyen de se débarrasser d'un malade devenu gênant. Après avoir tout essayé, on peut bien essayer aussi cela! De là des déboires dont le résultat est d'aggraver encore le malentendu qui s'évit sur l'opinion médicale.

De tout cela il résulte que les malades curables ne se présentent pas au Sanatorium en nombre suffisant pour occuper les places disponibles, tandis que les incurables en assiègent les portes. Or, comme il faut bien respecter les droits acquis et admettre les candidats dans l'ordre où ils se présentent, l'encombrement est tout au préjudice des sanatoriables qui, durant le délai d'attente, étant, de par leur situation, hors d'état de se soigner, voient leur état s'aggraver et le pronostic d'entrée se modifier en même temps que les conditions de traitement utile.

Faut-il ajouter que le choix médical comporte lui-même certaines difficultés, qu'il n'est pas toujours faute de prévoir quels seront les cas qui retireront du traitement le meilleur résultat et que, de se chef, la cure d'essai devient nécessaire pour un grand nombre de malades?

A coté des conditions médicales, il faut encore envisager, pour le recrutement du Sanatorium, les conditions sociales, et il est indispensable de faire précéder l'admission de chaque malade d'une enquête serieuse et compléte sur la situation sociale, ses moyens d'existence, sa conduite, sa moralité, sa sobriété, ses antécédents. En effet, il importe essentiellement que le milieu du Sanatorium soit un milieu tranquille, paisible, discipliné; il faut que les malades qui y viennent dans l'intention de s'y soigner puissent le faire sans dérangement et sans avoir à souffrir de promiscuité pénible ou de moeurs grossières; il faut aussi que le règlement général soit respecté et que la nécessité de contraindre quelques indisciplinés à une tenue décente n'oblige pas à des rigueurs pénibles aux malades dociles. Or l'experience prouve qu'il suffit de quelques énerguménes pour mettre le trouble et le désordre parmi toute une collectivité de braves gens; elle montre aussi qu'actuellement l'esprit d'indiscipline, d'insubordination fait dans le peuple, dans les pays latins surtout, des progrès énormes et que l'exercise de l'autorité la plus légitime, la plus motivée et la plus modérée se heurte souvent à un mauvais vouloir et à une hostilité systématiques. Il est inutile d'insister sur la fréquence actuelle de l'alcoolisme à laquelle il est lêgitime de rapporter la proportion croissante des demi-fous et des asociaux, rebelles à tout esprit de discipline et de solidarité. Toutes ces non-valeurs, débauchés, irréguliers, professionels du désordre, agités, demi-fous, alcooliques, doivent être élimi-

nées du sanatorium: inutile pour eux, leur présence y est nuisible pour les autres et c'est charité mal ordonnée que de les y accueillir. Il en est de même des personnes des 2 sexes dont la mauvaise conduite est avérée, cela pour des motifs faciles à comprendre, car si la charité doit être également bienveillante à toutes les misères, ce ne peut être qu'à la condition de ne pas nuire à l'objet même qu'elle poursuit et de ne pas perdre de vue l'intérêt général de son oeuvre.

Il est triste d'avoir à ajouter que l'extrême misère et qu'une profession trop pénible ou insalubre, constituant les obstacles au maintien des résultats obtenus, doivent être considérées également comme des obstacles à la cure sanatoriale.

A un autre point de vue, il est à souhaiter que le Sanatorium Populaire limite son oeuvre d'assistance. C'est un curieux fait, d'observation presque constante, que le développement des oeuvres d'assistance a créé chez nous toute une catégorie d'individus qui ont élevé le rôle d'assisté à la hauteur d'une profession et qui semblent croire sincèrement que la société leur doit le logis, le couvert, et les soins de façon indéfinie. Partés de ce principe, ils se montrent peu empressés à soigner et à se guérir, et en tous cas beaucoup moins disposés à profiter des ressources mises à leur disposition que ceux qui contribuent aux frais de leur traitement. Aussi l'assistance partielle donne-t'elle de bien meilleurs résultats que l'assistance intégrale. Il est vraiment pratiquement utile en même temps que moral et juste que l'individu contribue, pour une part calculée selon son pouvoir, aux sacrifices que la charité fait pour lui. Pour ce motif, il est à souhaiter que les Sanatoriums Populaires ne soient pas gratuits, tout en restant accessibles aux plus petites bourses: c'est le principe qui a présidé à l'organisation du Sanatorium d'Hauteville où le prix du pension a été, des l'origine, fixé à 2 francs 50.

Ainsi préparé par l'enquête morale et sociale et par toutes les éliminations d'ordre extra-médical, le recrutement médical du Sanatorium doit être livré à l'appréciation exclusive du médecin de l'établissement, seul vraiment indépendant et plus intéressé que quoiconque au bon fonctionnement et au bon rendement de l'oeuvre. La collaboration des médecins, celle surtout des dispensaires antituberculeux, peut lui être très précieuse, mais seul son examen direct et préalable à l'admission, quoique aussi rapproché d'elle que possible, est de nature à le renseigner exactement sur la qualité des malades qui lui sont addressés et sur lesquels, s'il s'en rapportait aux certificats, il risquerait d'être fréquemment trompé; l'expérience en fait foi. Il admettra le plus rapidement possible les cas qui lui sembleront curables et en seconde ligne les cas susceptibles de sérieuse amélioration: pour les cas litigieux, il aura recours à la cure d'essai, ordinairement concluant après un mois. Cette précaution permettra de ne pas frustrer du bien-

fait du traitement certains malades, qui, avec des apparences de début très médiocres, donnent parfois les meilleurs résultats.

Pour amener les malades au traitement précoce, nous ne pouvons compter que sur la formation de l'esprit médical et ensuite sur celle de l'esprit public, mieux averti du caractère insidieux et des dangers des maladies de poitrine: quelques indices permettent d'espérer dans ce sens une évolution favorable. Mais nous devons fonder nos meilleures espérances sur le développement des dispensaires antituberculeux urbains, très bien placés pour faire le diagnostic précoce, pour donner les conseils pressants et répétés qu'il faut pour convaincre le malade et qui sont appelés, loin d'être, comme on l'a voulu, les antagonistes du sanatorium, à devenir ses meilleurs collaborateurs, ses pourvoyeurs.

Aussi entrevoyons nous, pour l'avenir, une oeuvre antituberculeuse complète comme formée de divers organismes fonctionnant synergiquement dans chaque grande agglomération: les dispensaires urbains, assurant l'assistance à domicile, les enquêtes médicales et sociales, les secours, la prophylaxie avant et après la cure ainsi que le recrutement des cas sanatoriables; le sanatorium climatérique, outil du traitement; l'hôpital des tuberculeux, annexe suburbaine destinée à l'hospitalisation et à l'isolement des invalides définitifs, et enfin, au-delà du sanatorium, la colonie agricole, destinée aux curables convalescents, étape intermédiaire entre la cure et la reprise de la vie active, en même temps que moyen de faciliter aux anciens malades le changement de profession et le retour à la vie rurale. Au dispensaire central pourrait en outre utilement s'annexer un bureau de placement pour les anciens malades du sanatorium, ce mode d'assistance, très efficace, serait un auxiliaire puissant pour le maintien des résultats obtenus au sanatorium, maintien auquel le retour à une profession insalubre et, plus souvent encore, à un milieu malsain constitue le principal obstacle. Ainsi, à la sortie de l'établissement de cure, l'ouvrier ne serait pas jeté, désemparé, suspect à ses employeurs, privé de ressources, sur la pavé de la grande ville; guéri ou presque guéri, il trouvera dans la colonie agricole le moyen d'orienter sa vie vers une nouvelle direction professionelle; amélioré temporairement et revenu à des occupations anciennes, le dispensaire pourra le suivre, l'aider, le surveiller, le placer peut-être dans des conditions compatibles avec le maintien de sa santé; enfin, aux infortunés frappés irrémédiablement, l'hôpital suburbain ouvrira ses portes.

L'organisation d'un Sanatorium se prête mal à des développements théoriques d'ordre général: elle doit evidemment s'inspirer d'une foule de conditions locales et spécialement des moeurs du pays où l'établissement est créé. Il y a cependant quelques données générales qui peuvent être posées en principe et qui restent applicables partout. Il est certain par exemple, dès maintenant, que lorsque les conditions de recrutement des Sanatoriums

Populaires seront regularisées, il y aura avantage à créer des établissements unisexuels, groupés par deux sous la même direction, avec les services généraux communs, mais complètement séparés et independants quant aux malades et limités à environ 150 lits chacun, ce chiffre conciliant pour le mieux les avantages financiers avec les facilités de direction et de surveillance. Il semble bien démontré aussi que la direction disciplinaire et morale, ne pouvant tirer les mobiles et son autorité que des motifs médicaux et des nécessités de la cure en commun, doit-être mise entre les mains du médecin. Sur ces points tout le monde est à peu près d'accord. Peur-être trouverait-on plus de divergences sur la question de l'emplacement à donner aux Sanatoriums. Il nous semble, pour notre part, qu'il y a un intérêt majeur à assurer aux malades les adjuvances de la cure climatérique, si manifestement efficaces pour le traitement de la tuberculose pulmonaire. Les Sanatoriums Populaires devraient tous être en montagne parce que, à de rarissimes exceptions près, les malades justiciables du Sanatorium le sont également de la cure d'altitude et que beaucoup en retirent un énorme bénéfice que ne leur assure pas, au même degré, la cure rationnelle en plaine et aussi parce que, parmi les cures climatériques, la cure d'altitude est la seule qui soit praticable avec avantage toute l'année, condition essentielle à la bonne marche d'un établissement populaire. Les climats méridionaux, doux et ensoleillés, si séduisants à première vue, ne sont habitables pour les tuberculeux que pendant 4 mois par an, et c'est une raison suffisante pour que la création d'un Sanatorium Populaire, sous un tel climat, soit pratiquement irréalisable; l'expérience là d'ailleurs démontré. Quant aux climats marins proprement dits, ils ne sont pas applicables à la généralité des tuberculeux pulmonaires. Aussi croyons-nous que la cure d'altitude deviendra de plus en plus le corollaire et l'adjuvant indispensables à la cure sanatoriale, surtout pour les établissements populaires astreints à des obligations budgétaires qui rendent nécessaire le fonctionnement continu.

Les résultats dans les Sanatoriums Populaires seront ce que seront la direction, la situation climatérique et surtout le recrutement de ces établissements. Nous donnons ci-joints, à titre documentaire, les résultats immédiats et éloignés qu'avec un recrutement encore imparfait nous avons obtenus au Sanatorium Populaire Lyonnais d'Hauteville, depuis son fondaion jusqu'au 1er. Janvier, 1908, c'est-a-dire en 7 ans. Ces résultats so trouvent résumés en deux tableaux statistiques, reproduits ci-après, dans le commentaire détaillé desquels il n'y a pas lieu d'entrer ici; nous nous bornerons à souligner quelques chiffres importants.

La classification de nos cas, pour l'évaluation des résultats immédiats est faite selon la forme clinique (diagnostic anatomique d'entrée) et selon le degré de gravité initiale, en admettant comme d'habitude 3 degrés: cas légers, moyens et graves; la statistique ne porte que sur les malades traités

au moins trois mois. Les résultats sont répartis en 6 groupes, differenciés par l'importance de l'amélioration obtenue, depuis l'aggravation ou l'état stationnaire jusqu'à la disparition des signes évolutifs actuels. La proportion des guérisons apparentes s'est maintenue constamment depuis le début aux environs de 20 pour cent; celle des quasi guérisons atteint à peu près le même chiffre et la proportion totale des améliorations de tout degré avoisine 90 pour 100. Il est facile, en parcourant le tableau, de s'assurer de la rigoureuse proportionnalité qu'il y a entre les résultats obtenus et la gravité initiale des cas. La disparition des bacilles dans l'expectoration, au cours du traitement, a été observée dans 208 cas, soit 13.3 pour 100 du total.

En somme, le Sanatorium ne guérit pas les tuberculeux incurables, ainsi qu'il fallait s'y attendre, mais il aide à la guérison des cas spontanément curables; il entraine assez fréquemment des hèsitants, quelquefois des médiocres, dans la bonne voie; il améliore les autres dans une large proportion, souvent pour longtemps, et les met à même d'entretenir ou même de perfectionner ultérieurement cette amélioration.

Les résultats éloignés sont eux-mêmes intérressants et se montrent très caractéristiques du rôle et de la portée de l'influence du Sanatorium. Nos enquêtes post-sanatoriales, résumées dans un des tableaux ci-après, sont faites un an, puis deux ans après le départ des malades: elles comportent un certificat du médecin traitant actuel. On y remarquera des améliorations post-sanatoriales (18 pour 100 après un an et 25 pour 100 après deux ans) qui nous montrent, se confirmant avec le temps, les résultats vraiment favorables obtenus au Sanatorium. D'une façon générale, nous voyons 84 pour 100 de nos résultats maintenus ou améliorés aprés un an et 85 pour 100 après deux ans; il est a noter toutefois que la deuxième enquête ne porte que sur les malades qui ont répondu à la première, c'est-a-dire, sur un total moindre de malades. La capacité de travail totale ou partielle suit la même progression; de 74 pour 100 des réponses après un an, elle s'élève à 84% après 2 ans.

Ces chiffres montrent en tous cas que les résultats du Sanatorium ne sont pas aussi fragiles qu'on l'avait supposé; même chez les gens du peuple, appelés dès leur sortie à reprendre une existence, il est vrai, laborieuse, mais que l'éducation acquise pendant la cure leur permet souvent de rendre plus hygiénique et plus compatible avec leur état de santé. Ces résultats ne pourront d'ailleurs que s'améliorer à mesure que le Sanatorium Populaire, mieux compris du public et des médecins, renfermé dans son véritable rôle, qui est la cure et non l'assistance, s'approchera d'avantage de l'idéal, que nous commençons à concevoir pour lui.

RÉSULTATS IMMÉDIATS TOTALISÉS AU 1ER JANVIER 1908.

ETAT DES MALADES SORTIS APRÈS UN SÉJOUR MINIMUM DE 3 MOIS, AU SANATORIUM, DEPUIS L'ORIGINE JUSQU'A LA FIN DE 1907.

	FORMES CLINIQUES (RÉPARTITION D'APRÈS LE DIAGNOSTIC D'ENTRÉE ET LA GRAVITÉ).														NOMBRE.	BACILLIFÈRES.		POIDS.
	Proetuberculose et tuberculose ganglionnaire.	Tuberculose parenchymateuse.						Tuberculose interstitielle.		Tuberculose bronchique.		Tuberculose pleurale.		Septicémie tuberculeuse sans localisations fixes.		A l'entrée.	A la sortie.	Augmentation moyenne par malade.
		Fibreuse.		Fibro-caséeuse commune.														
		Diffuse.	Dense.	Etendue à 1 lobe.	Etendue à 2 lobes.	Etendue à plus de 2 lobes.	Ulcéreuse localisée.	Caséeuse massive ou extensive.	Granulie discrète pleuropulmonaire et tub. abortive.	Granulie poly-viscérale.	Superficielle.	Profonde broncho-pneumonique.	Superficielle.	Profonde pneumonie pleurogène pneumothorax.					
		au maximum.																
	I	I	II	I	II	III	III	III	I	II	I	II	I	II					
I. Ne présentant plus aucun signe de maladie actuelle	4	157	3	27	2	..	..	..	29	4	51	1	27	3	..	308 (19,73%)	55	..	+ 4,925 K.
II. Présentant encore quelques signes objectifs légers	0	79	3	66	48	7	5	..	13	2	57	3	13	19	..	315 (20,15%)	132	62	+ 5,983 K.
III. Très améliorés à tous les points de vue	..	41	3	94	161	74	17	2	..	..	25	29	5	67	..	518 (33,14%)	392	316	+ 5,304 K.
IV. Amélioration de l'état général avec lésions stationnaires	..	3	1	14	67	90	11	16	..	..	6	15	1	32	2	258 (16,50%)	225	218	+ 3,942 K.
V. Peu améliorés	..	3	3	6	15	25	9	2	..	1	..	9	..	12	1	86 (5,50%)	73	72	—0,082 K.
VI. Stationnaires ou aggravés	..	1	..	3	19	31	3	11	..	..	..	5	..	5	..	78 (4,99%)	71	72	—0,049 K.
		284	13	210	312	227	45		42	7	139	62	46	138		1563	948	740	+ 4,578 K.
																	60,60%	47,34%	
		297		794				31										
	4	1122							49		201		184		3		—208		
	1563																		

1399 (89,9%).

RÉSULTATS ELOIGNÉS TOTALISÉS DEPUIS L'ORIGINE JUSQU'AU 1ER JANVIER 1908.

A la Sortie.	Etat des Malades.											
	Après 6 à 12 mois.						Après 18 à 24 mois.					
	Améliorés.	Stationnaires.	Aggravés.	Totaux.	Capacité de travail.		Améliorés.	Stationnaires.	Aggravés.	Totaux.	Capacité de travail.	
					Totale.	Partielle.					Totale.	Partielle.
I. Ne présentant plus aucun signe de maladie actuelle (guéris)	..	204	33 (13,96%)	237			..	132	15 (10,20%)	147		
II. Guéris en apparence, mais conservant encore quelques signes objectifs légers	60	129	37 (16,37%)	226			59	71	21 (13,90%)	151		
III. Très améliorés à tous les points de vue	75	182	50 (16.28%)	307	474	176	50	74	28 (18,39%)	152	310	100
IV. Améliorés seulement au point de vue général, avec lésions du poumon stationnaires	20	44	14 (17,94%)	78	55,30% des rép.	20,53% des rép.	11	16	7 (20,64%)	34	63,65% des rép.	20,53% des rép.
V. Peu améliorés	5	1	3 (33,33%)	9	35,06% des sort.	13,01% des sort.	2	1	..	3	27,48% des sort.	8,86% des sort.
Totaux	160 18,67%	560 65,34%	137 15,98%	857 (63,38% des sorties)	640 (74,68% des réponses) (47,33% des sorties)		122 25,05%	294 60,37%	71 14,58%	487 (43,17% des sorties)	410 (84,19% des réponses) (36,34% des sorties)	
	720 (84,01% des réponses) (53,2 % des sorties)						416 (85,42% des réponses) (36,87% des sorties)					

		Après 6 à 12 mois.	Après 18 à 24 mois.
Statistique des enquêtes faites sur les anciens malades, depuis l'origine jusqu'au 1er Janvier 1908	Nombre des enquêtes faites	1038 (76,77% des sorties)	668 (59.21% des sorties)
	Réponses : avec certificat médical	468 (54,60% des réponses)	226 (46,40% des réponses)
	Réponses : sans	389	261
		857 (82,48% des enquêtes)	487 (72,40% des enquêtes).
	Non réponses	156	120
	Déces	25	61

A STATISTICAL STUDY OF ONE HUNDRED CASES OF LARYNGEAL TUBERCULOSIS TREATED WITH FORMALDEHYD.

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In this study I propose being as brief as is consistent with fair presentation, and for that reason have omitted protocols, giving the important facts of each case in the appended tables. The method of treatment has been exclusively the topical application of formaldehyd solution directly to the larynx. I have not tabulated any case treated previous to the time when, by a process of evolution, I adopted formalin solution, to the practical exclusion of all other pigments and sprays. I might say in passing that the use of other plans, including surgical procedures, has been rather extensively tried before I came to use formalin so generally. I have omitted all cases treated less than one month, for the reason that such cases compose a class of dying consumptives, and it would be manifestly unfair to any method to include them. Also, I have not used those cases in which tuberculin was employed in addition to the formalin, for I am not yet prepared to formulate my opinion as to the value of tuberculin in these cases, and also because some of my hearers might quite justifiably draw the conclusion that the result, good or bad, might be attributed to the tuberculin rather than to the formaldehyd. I have omitted as well cases with the additional complication of pharyngeal tuberculosis, for I wish to confine this discussion to cases solely of the laryngeal type.

It may be well to state that all of my cases occurred as a complication of unquestioned pulmonary tuberculosis. This aids in simplifying the question of diagnosis, for when a seemingly permanent affection of the larynx complicates pulmonary tuberculosis, it is presumptive evidence at least in favor of the tuberculous nature of the laryngeal process. I appreciate, of course, that in very early stages of infiltration of the larynx it is next to impossible to pronounce for or against the tuberculous nature of the trouble and do so infallibly. It follows, I think, that some mistakes have occurred in my diagnoses. Suffice it to say that I have been as careful as possible, and have brought to bear a rather long experience in the observation of tuberculous laryngitis. In the ulceration type of this affection there is usually

no question of the diagnosis, the veriest tyro being able to recognize the disease at a glance, especially when it is already known that pulmonary tuberculosis exists. Syphilis is about the only thing that can raise a doubt, and that is usually easy of differentiation by well-known tests.

As there is a great prognostic difference between ulcerated and infiltrated types of laryngeal tuberculosis, it strikes me as wise to discuss and tabulate each of these types separately, and this I have done. In the tables there are a few points that call for explanation. For instance, the temperature given is the daily average maximum. The presence or absence of tubercle bacilli in the sputum is indicated by the signs + and —. In describing the extent of the pulmonary lesion the Turban divisions I, II, and III are employed, and in general correspond to the types incipient, moderately advanced, and far advanced. I mean the term apparent cure in the same relative sense that we employ it in the pulmonary disease. I doubt if I have ever seen complete restitution follow tuberculous laryngitis, and would be rather inclined to doubt the diagnosis in any case in which such a result was obtained. More specifically I mean by the term apparent cure the complete healing of all ulcers, a relative restitution of normal conditions and functionating power, and the absence of all signs of active disease. In arbitrarily stating that a "cure" has occurred in laryngeal tuberculosis, I would be placing myself in a position not justified by the subsequent history in many cases, and would not apply this term in any case lasting in good condition for less than three years subsequent to discharge. I appreciate that our inability to honestly and scientifically employ the term "cure" invalidates to a certain extent the value of any case study that can be presented, but the difficulty is inherent and cannot well be avoided.

Many men have applied themselves to the treatment of laryngeal tuberculosis, but I have not been able to discover that any one has been quite as persistent in the application of any method as I have. Laryngeal tuberculosis is busy all the twenty-four hours, and I long ago concluded that the physician who hopes to conquer it will be kept pretty busy too. Occasional treatments really have no place in this affection. As near perfect cleanliness as possible, with, in ulcerated cases, the elimination of local mixed infections, and in non-ulcerated cases the removal of sputum masses, is, I believe, the sine qua non of successful treatment. In ulceration the mixed infections are, I think, largely the causes of pain and discomfort. Formaldehyd is the agent which in my hands has proved most potent in meeting the conditions presented by laryngeal tuberculosis, in both the ulcerated and non-ulcerated types. Its wonderfully quick penetrability, and the peculiar and quite distinctive hardening and toughening effect it has upon the involved tissues make it the agent of choice in this dreadful affection. Rich-

ard Lake places it in the front rank of drugs employed in laryngeal tuberculosis, and for my part I would give it first place.

Twice daily, morning and evening, I apply the treatment, and would do it even oftener if it were practicable. As it is, this method has reduced me almost to slavery for the past ten years, but the results achieved have proved amply compensating. Of course, the time involved in the application of this method should be considered in the estimation of its value. The fact that the treatment, to be successful, must be applied so frequently practically invalidates it as an office procedure, and confines it largely to institutions where the patient is at all times available without undue strain or stress on his part. Laryngeal lesions unfortunately exist, as a rule, in a very sick class of tuberculous subjects, and, of course, they cannot afford the expenditure of effort that would follow visiting a physician at his more or less distant office. Thus the method, as I have tried to point out, has distinct limitations.

With an intralaryngeal tip I first carefully cleanse the parts of secretions, using for this purpose a solution of tar-water and sodium bicarbonate (500 grs. to one gallon), which, as pointed out years ago by J. Solis Cohen, is one of the best non-irritating solvents of viscid secretions. Then I thoroughly mop and scrub the ulcerations with a solution of formalin in water, beginning with two drops of formalin in one ounce of water, and increasing as tolerance is gained, usually reaching ten drops to the ounce at the end of two weeks or a month even in badly ulcerated cases. The more extensive the ulceration, the longer the time consumed in reaching the strongest solution and the greater the pain of application. In spite of the pain that always occurs in ulcerated cases I have never observed any signs of irritation, and even in the worst cases the pain of application is quite evanescent. The solution of formalin is applied on a cotton mop carried in the jaws of a toothed laryngeal applicator, the Cohen type. The force used is of course gentle, and depends upon how easily the surface bleeds. I think it desirable to avoid hemorrhage—a drop or two of blood on the cotton I do not mind. In non-ulcerated cases I apply the ascending formalin solutions by means of a spray, using the intralaryngeal tip as designed by Otto Freer, and accomplish cleansing and application of formalin at the same time. In this class the application is not attended with pain or irritation in the strength recommended.

It must be remembered that all of my patients are under treatment for pulmonary as well as laryngeal tuberculosis, and that every means of a dietetic and hygienic nature of proved and classic value in tuberculosis is employed along with the laryngeal treatment. I also wish to mention that they have all received treatment in institutions under my direction located in one of the noted climatic regions of the world—dry, high, bracing, and clear.

I think we all admit the value of climatic change in many forms of chronic disease as well as tuberculosis, and are prepared to admit the value of climate, *per se*, in the same sense that we would choose the most desirable room in a house for one of our typhoid patients. I think myself that such a dry, high, bracing, and sunshiny climate has an effect peculiarly its own in tuberculosis, and which accounts, in a measure, for the results obtained. At the New Mexico Cottage Sanatorium we have shown that our moderately and far-advanced cases exhibit a blood-pressure which averages 25 per cent. greater than that presented by incipient cases at sea-level. This discovery may be the means of placing high altitudes in tuberculosis on a rational basis.

By referring to the tables it will be seen that all of the twenty-five ulcerative cases occurred in members of the male sex, illustrating what has long been known—that most of these cases occur in men. The average age was twenty-eight years, corresponding to the time of life that tuberculosis occurs most frequently. In none of these cases was the temperature normal on admission, showing that ulcerated laryngeal tuberculosis is almost always accompanied by febrility, which is another way of saying that it occurs in otherwise advanced cases, as a rule. The average daily maximum temperature on admission was 100.04° F. On discharge the average daily maximum temperature was 99.9° F., and this notwithstanding that there were nine, or 36 per cent., discharged with a normal temperature, the average temperature on discharge being raised by the fact that in several cases discharged as progressive the temperature was much higher on discharge than on admission. Seventeen of the twenty-five cases gained weight, the average gain being 11+ pounds. One patient remained the same, and seven lost weight, the average loss being 22+ pounds. The aggregate gain in seventeen cases was 246 pounds, and the aggregate loss was 160 pounds in seven cases. In all of these cases tubercle bacilli were demonstrated both on admission and discharge. On admission the general condition was recorded as good in thirteen cases, as fair in nine cases, and as bad in three. On discharge the general condition was recorded as good in sixteen cases, as fair in two, and as bad in seven cases. The pulmonary lesion was recorded as incipient on admission in four cases, or 16 per cent.; as moderately advanced in five, or 20 per cent.; and as far advanced in sixteen, or 64 per cent. All of these cases were classified the same on discharge as on admission. This illustrates the well-known fact that this complication occurs most often in far-advanced cases, and but rarely as an association of pulmonary incipiency.

Actual pain of deglutition was present in but nine, or 36 per cent., at the time of admission, and in but three, or 12 per cent., on discharge. This illustrated a by no means well-known fact, that even ulcerative laryngeal tuberculosis is a painful affection much less often than is supposed, although

capable, as the upper structures are invaded, of becoming really a dreadful disease. If, however, the lower parts of the larynx only are invaded, pain is oftener absent than present. The efficiency of the treatment in controlling the pain is shown by the fact that it was present in but three cases at the time of discharge, and actually failed to relieve in none. I have omitted mention of slight degrees of discomfort, which, of course, are present in most of these cases. The average length of time under treatment was almost exactly one year, which graphically tells the story of the long and persistent effort required. In most of the successful cases it was much longer than a year.

In four cases, or 16 per cent., the laryngeal result was recorded as an arrest; in fourteen, or 55 per cent., as an apparent cure; in four, or 16 per cent., as improved; and in three, or 12 per cent., as progressive.

The general result, which, of course, implies the fate of the patient, was recorded as arrested in eight, or 32 per cent.; as improved in ten, or 40 per cent.; and as progressive in seven, or 28 per cent. It will thus be seen that I have no apparent cures to record in cases complicated by ulcerative laryngeal tuberculosis, all having presented tubercle bacilli on discharge.

In eight cases discharged as arrested the laryngeal result was recorded as an apparent cure in eight, or 100 per cent., of successes in the most favorable class of cases—those in which, from a general as well as pulmonary point of view, an arrest was possible.

In ten cases discharged as improved the laryngeal result was recorded as apparent cure in five, or 50 per cent., and as improved in five, or 50 per cent. In this, the next most favorable class, there were no actual laryngeal failures and 50 per cent. of real successes.

In seven cases discharged as progressive a remarkable thing occurred, for in four, or over 50 per cent., the laryngeal result was recorded as arrested, and in but three, or less than 50 per cent., as progressive, corresponding with the general result. I believe that this last class, the most unfavorable, in which the laryngeal result was an actual failure in less than half, shows better than anything else I have had to say the value of formaldehyd in controlling the ulcerative type of laryngeal tuberculosis.

In the seventy-five non-ulcerative cases, sixty-six, or 88 per cent., were in men. The average age was thirty+ years. In eleven of these cases, or 14 per cent., the temperature was normal on admission. The temperatures, in common with all other facts deduced from the statistics of non-ulcerative cases, make a better showing than those derived from the class previously considered. In the non-ulcerated class we are not dealing with quite such desperately sick people. The average temperature on admission was 100.4° F., and on discharge it was 99° F. Sixty of the seventy-five cases gained weight, four remained the same, and eleven lost weight. Of those

who gained weight, the average was 15+ pounds. Of those who lost, the average was 7+ pounds. The aggregate gain was 958 pounds. The aggregate loss was 86 pounds. Tubercle bacilli were demonstrated on admission in all of the cases. They were absent on discharge in twenty, or 26 per cent., showing that we are not dealing with such an essentially incurable class as in the ulcerative type. The general condition was recorded as good on admission in twenty-five cases, as fair in eighteen cases, and as poor or bad in thirty-two cases. At the time of discharge the general condition was put down as good in fifty-two cases, as fair in eleven, and as poor or bad in twelve cases. The pulmonary lesion was recorded as incipient on admission in twelve cases, or 16 per cent.; as moderately advanced in nineteen, or 25 per cent.; and as far advanced in forty-four, or 58 per cent. This shows that in this as in the ulcerative class we are still dealing with an unfavorable type from the point of view of apparent cure. The classification of pulmonary status on discharge differs so slightly from that on admission that it is not worthy of special mention. Pain on deglutition was present at the time of admission in none of these cases, and at the time of discharge in but two, showing plainly that tuberculous infiltration is but rarely a painful affection. The average time of treatment in this class was eleven and one-half months, showing that it requires about as much time to accomplish a result in this as in the ulcerative class.

In twelve cases, or 16 per cent., the laryngeal result was recorded as an arrest; in 44 cases, or 58 per cent., as apparent cure; in nine, or 12 per cent., as improved; and in ten, or 13 per cent., as progressive.

The general result was recorded as an arrest in twenty-three cases, or 30 per cent.; as an apparent cure in twenty, or 28 per cent.; as improved in fifteen, or 20 per cent.; and as progressive in seventeen, or 22 per cent.

It naturally may be understood that in all cases discharged as apparent cures the laryngeal result corresponded. In those discharged with the general result arrest, twenty-three in number, there were seventeen, or 74 per cent., with the laryngeal result recorded as apparent cure; five, or 21 per cent., as arrested; one, or 4 per cent., as improved; and none were discharged with the laryngeal result recorded as progressive.

In those discharged with the general result improved, fifteen in number, the laryngeal result was recorded as an arrest in two, or 13 per cent.; as apparent cure in seven, or 48 per cent.; as improved in six, or 40 per cent.; and in none was the result progressive.

In those discharged with the general result progressive, seventeen in number, the laryngeal result was recorded as an arrest in five, or 30 per cent.; as apparent cure in none; as improved in two, or 11 per cent.; and as progressive in ten, or 60 per cent.

Conclusions.—Ulcerative laryngeal tuberculosis occurs in otherwise

such a far-advanced class of pulmonary invalids that real cure is, as a rule, quite out of the question. As has been seen, I have no apparent cures to record in this class. The relief of symptoms is surprisingly effective, and, considered solely as a humanitarian measure, justifies the employment of formaldehyd in the time-consuming and painstaking manner described in this paper. From the point of view of the larynx alone the results are brilliant, and certainly contribute to a prolongation of life, and even usefulness. I think that a careful consideration of my results not only proves the value of formalin in ulcerative cases, but also shows that when the larynx is thus treated it falls into its proper place—a really insignificant lesion as compared with that having its seat in the lungs. Laryngeal tuberculosis of the ulcerative type is largely a manifestation of broken resistance and a really terminal state, and that is, after all, the reason why we regard it as so formidable.

In regard to the results achieved in the non-ulcerative class I am prepared to have some maintain that under the general treatment employed, associated with the complete physiologic and functional rest enjoined, the results would have been equally as good without the use of formalin. I do not think so, and do most earnestly believe in the efficiency of this agent in preventing ulceration and keeping a closed lesion closed, and we all know the fate of a tuberculous lesion that is maintained in the closed state long enough—ultimately it means cure.

I have no hesitation, therefore, in recommending this method in the treatment of laryngeal tuberculosis, and most earnestly desire that it may be thoroughly tried by those having the opportunity.

Case.		Sex.	Age (Years).	Temperature.	Weight.	T. P. S.	General Conditions.	Pulmonary Lesion.	Pain.	Time (Months).	Laryngeal Lesion on Admission.	Laryngeal Result.	General Result.
1	Admission..	M.	20	99°	135	+	Good.	III	+	6	General infiltrat. Ulcer. arytenoids.	Arrest.	Progressive.
	Discharge...			102.3°	105	+	Bad.	III	—	..			
2	Admission..	M.	30	101.2°	140	+	Good.	II	—	8	Inf. cords, arytenoids. Near rt. cord.	Improved. Cure of ulcer.	Improved.
	Discharge...	..	..	99.3°	153	+	Good.	II	—	..			
3	Admission..	M.	42	99.4°	126	+	Fair.	III	—	3	Ulceration and inf. of cords.	Progressive.	Progressive.
	Discharge...	..	..	100.2°	118	+	Bad.	III	—	..			
4	Admission..	M.	30	100.2°	146	+	Good.	III	+	23	Ulcer, cords and ary., and infil. remainder of larynx.	Improved. Cure of ulcer.	Improved.
	Discharge...	..	..	99.3°	167	+	Good.	III	—	..			
5	Admission..	M.	37	100°	160	+	Good.	I	—	3	Inf. rt. aryt. Ulcerated papillo.	Improved. Ulcer. cured.	Improved.
	Discharge...	..	..	99.4°	160	+	Good.	I	—	..			
6	Admission..	M.	29	100.°	99	+	Bad.	III	+	17	General ulceration below epiglot.	App. cure.	Arrest.
	Discharge...	..	..	N.	119	+	Fair.	III	—	..			
7	Admission..	M.	18	100°	126	+	Fair.	III	—	9	General infiltration. Ulcer. of cords.	Arrest.	Progressive.
	Discharge...	..	..	102.1°	100	+	Bad.	III	—	..			
8	Admission..	M.	27	101°	100	+	Bad.	III	+	24	General ulceration including epiglot.	App. cure.	Arrest.
	Discharge...	..	..	N.	135	+	Good.	III	—	..			
9	Admission..	M.	20	101.3°	107	+	Bad.	III	+	19	General infiltration, ulcer. cords and epiglottis.	App. cure.	Arrest.
	Discharge...	..	..	N.	127	+	Fair.	III	—	..			
10	Admission..	M.	26	100°	150	+	Good.	III	—	20	Ulcer. of cords.	App. cure.	Improved.
	Discharge...	..	..	99.3°	161	+	Good.	III	—	..			

ULCERATIVE TUBERCULOUS LARYNGITIS.—(*Continued.*)

Case.		Sex.	Age (Years).	Temperature.	Weight.	T. P. S.	General Condition.	Pulmonary Lesion.	Pain.	Time (Months).	Laryngeal Lesion on Admission.	Laryngeal Result.	General Result.
11	Admission ..	M.	38	99.3°	138	+	Fair.	III	—	18	Ulcer. cords. Inf. post. wall.	App. cure.	Arrest.
	Discharge...	..	..	N.	156	+	Good.	III	—	..			
12	Admission ..	M.	26	99.2°	118	+	Fair.	II	+	12	General inf. and ulceration.	Improved.	Improved.
	Discharge...	..	..	N.	125	+	Good.	II	—	..			
13	Admission ..	M.	30	99.4°	132	+	Fair.	III	—	15	General infil. Ulcer. of cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	157	+	Good.	III	—	..			
14	Admission ..	M.	27	99.2°	130	+	Fair.	III	+	8	Gen. Inf. Ulcer. cords and arytenoids.	Arrest.	Progressive.
	Discharge...	..	..	103°	116	+	Bad.	III	+	..			
15	Admission ..	M.	29	100°	137	+	Good.	II	—	10	Infil. arytenoids. Ulcer. cords.	App. cure.	Improved.
	Discharge...	..	..	99.3°	148	+	Good.	II	—	..			
16	Admission ..	M.	27	99.3°	130	+	Good.	III	—	4	General infil. Ulcer. of cords.	Arrest.	Progressive.
	Discharge...	..	..	102.4°	105	+	Bad.	III	—	..			
17	Admission ..	M.	22	102°	130	+	Fair.	II	—	9	General inf. Ulcer. of cords and post. wall.	App. cure.	Improved.
	Discharge...	..	..	99.1°	137	+	Good.	II	—	..			
18	Admission ..	M.	42	100.2°	128	+	Good.	III	—	24	Ulcer. rt. cord and rt. arytenoid. Inf. remainder larynx.	App. cure.	Arrest.
	Discharge...	..	..	N.	154	+	Good.	III	—	..			
19	Admission ..	M.	35	99.4°	144	+	Good.	I	—	5	Inf. ary. and cords. and ulcer. rt. arytenoid.	App. cure.	Improved.
	Discharge...	..	..	99.4°	160	+	Good.	I	—	..			

ULCERATIVE TUBERCULOUS LARYNGITIS.—(*Continued.*)

CASE.		SEX.	AGE (YEARS).	TEMPERATURE.	WEIGHT.	T. P. S.	GENERAL CONDITION.	PULMONARY LESION.	PAIN.	TIME (MONTHS).	LARYNGEAL LESION ON ADMISSION.	LARYNGEAL RESULT.	GENERAL RESULT.
20	Admission..	M.	19	99.2°	131	+	Good.	III	+	7	Inf. arytenoids. Ulcer. epiglot.	Progressive.	Progressive.
	Discharge...	..	..	102°	100	+	Bad.	III	+	..			
21	Admission..	M.	33	100.1°	142	+	Good.	I	—	7	Ulcer. of cords.	App. cure.	Improved.
	Discharge...	..	..	99°	147	+	Good.	I	—	..			
22	Admission..	M.	21	100°	141	+	Good.	III	—	18	Ulcer. and inf. of cords.	App. cure.	Improved.
	Discharge...	..	..	99.1°	145	+	Good.	III	—	..			
23	Admission..	M.	29	100°	116	+	Fair.	II	+	17	Ulcer. of aryt. and epiglot. inf. of remainder.	App. cure.	Arrest.
	Discharge...	..	..	N.	131	+	Good.	II	—	..			
24	Admission..	M.	33	99.1°	122	+	Fair.	II	—	9	Ulcer. of cords and inf. of remainder of larynx.	App. cure.	Arrest.
	Discharge...	..	..	N.	127	+	Good.	II	—	..			
25	Admission..	M.	21	99°	133	+	Good.	III	—	6	Ulcer. aryt. and general infil.	Progressive.	Progressive.
	Discharge...	..	..	103°	107	+	Bad.	III	+	..			

NON-ULCERATIVE TUBERCULOUS LARYNGITIS.

Case.		Sex.	Age (Years).	Temperature.	Weight.	T. P. S.	General Condition.	Pulmonary Lesion.	Pain.	Time (Months).	Laryngeal Lesion on Admission.	Laryngeal Result.	General Result.
1	Admission..	M.	26	100°	108	+	Bad.	I	—	4	Infiltration of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	147	—	Good.	0	—	..			
2	Admission..	M.	37	N.	120	+	Fair.	II	—	8	Infiltration of cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	125	+	Good.	II	—	..			
3	Admission..	F.	40	N.	117	+	Poor.	III	—	15	Infiltration of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	158	—	Good.	II	—	..			
4	Admission..	M.	25	102°	114	+	Bad.	I	—	24	Infiltration of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	150	—	Good.	0	—	..			
5	Admission..	M.	39	N.	156	+	Good.	II	—	12	Infiltration of cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	167	+	Good.	II	—	..			
6	Admission..	F.	24	N.	107	+	Bad.	III	—	13	Infil. of cords and post. wall.	App. cure.	Arrest.
	Discharge...	..	..	N.	147	+	Good.	II	—	..			
7	Admission..	F.	32	N.	137	+	Good.	I	—	7	Infil. cords and arytenoids.	App. cure.	App. cure.
	Discharge...	..	..	N.	149	—	Good.	I	—	..			
8	Admission..	M.	25	102.1°	131	+	Good.	II	—	24	Infiltration of cords.	App. cure.	Improved.
	Discharge...	..	..	102°	137	+	Good	II	—	..			
9	Admission..	M.	37	102.2°	156	+	Good.	II	—	10	Infil. rt. cord.	App. cure.	Improved.
	Discharge...	..	..	99.3°	160	+	Good.	II	—	..			
10	Admission..	M.	35	102°	125	+	Fair.	II	—	6	Infiltration of cords.	Progressive.	Progressive.
	Discharge...	..	..	100.3°	120	+	Bad.	III	—	..			
11	Admission..	M.	36	99.1°	127	+	Fair.	III	—	19	Infiltration of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	145	—	Good.	III	—	..			

NON-ULCERATIVE TUBERCULOUS LARYNGITIS.—(*Continued.*)

CASE.		SEX.	AGE (YEARS).	TEMPERATURE.	WEIGHT.	T. P. S.	GENERAL CONDITION.	PULMONARY LESION.	PAIN.	TIME (MONTHS).	LARYNGEAL LESION ON ADMISSION.	LARYNGEAL RESULT.	GENERAL RESULT.
12	Admission ..	M.	21	100°	140	+	Good.	III	—	6	Infil. left cord.	Improved.	Arrest.
	Discharge...	..	..	N.	145	+	Good.	III	—	..			
13	Admission ..	M.	36	99°	131	+	Fair.	III	—	16	Infil. of cords.	Improved.	Progressive.
	Discharge...	..	..	N.	165	+	Good.	III	—	..			
14	Admission ..	F.	30	99.1°	116	+	Poor.	III	—	20	Infil. rt. cord and rt. arytenoid.	Improved.	Improved.
	Discharge...	..	..	98.4°	123	+	Fair.	III	—	..			
15	Admission ..	M.	27	99.2°	120	+	Poor.	II	—	5	Inf. cords, post. wall and arytenoids.	Progressive.	Progressive.
	Discharge...	..	..	N.	122	+	Poor.	III	—	..			
16	Admission ..	M.	28	99.1°	162	+	Good	III	—	4	Inf. cords and rt. arytenoid.	Arrest.	Arrest.
	Discharge...	..	..	N.	162	+	Good.	III	—	..			
17	Admission ..	M.	30	99.3°	147	+	Good.	III	—	12	Infil. cords, ary. and post. wall.	App. cure.	Arrest.
	Discharge...	..	..	N.	168	+	Good.	III	—	..			
18	Admission ..	M.	32	102°	123	+	Bad.	III	—	6	Infil. of cords.	Arrest.	Progressive.
	Discharge...	..	..	102°	104	+	Bad.	III	—	..			
19	Admission ..	M.	31	100°	137	+	Poor.	III	—	21	Inf. left cord.	App. cure.	App. cure.
	Discharge...	..	..	N.	163	—	Good.	III	—	..			
20	Admission ..	M.	34	100°	137	+	Fair.	III	—	14	Infil. arytenoids and epiglottis.	Arrest.	Arrest.
	Discharge...	..	..	N.	167	+	Good.	III	—	..			
21	Admission ..	M.	23	102°	142	+	Fair.	II	—	6	Infil. of cords.	App. cure.	Improved.
	Discharge...	..	..	100°	142	+	Fair.	II	—	..			
22	Admission ..	M	19	99.2°	131	+	Good.	III	—	7	Infiltration of cords.	Arrest.	Arrest.
	Discharge...	..	..	N.	146	+	Good.	III	—	..			

NON-ULCERATIVE TUBERCULOUS LARYNGITIS.—(*Continued.*)

Case.		Sex.	Age (Years).	Temperature.	Weight.	T. P. S.	General Condition.	Pulmonary Lesion.	Pain.	Time (Months).	Laryngeal Lesion on Admission.	Laryngeal Result.	General Result.
23	Admission ..	M.	47	102°	120	+	Poor.	III	—	6	Infil. of cords.	Progressive.	Progressive.
	Discharge...	..	..	99.4°	116	+	Poor.	III	—	..			
24	Admission ..	M.	28	99.4°	133	+	Poor.	III	—	24	Infil. cords and arytenoids.	App. cure.	App. cure.
	Discharge...	..	..	N.	158	—	Good.	II	—	..			
25	Admission ..	M.	32	100°	128	+	Poor.	III	—	13	Inf. cords and false cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	136	+	Good.	III	—	..			
26	Admission ..	M.	36	99.1°	120	+	Fair.	III	—	9	Infil. of cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	131	+	Fair.	III	—	..			
27	Admission ..	M.	35	99.3°	124	+	Fair.	III	—	7	Infil. rt. cord.	Arrest.	Progressive.
	Discharge...	..	..	99.2°	126	+	Fair.	III	—	..			
28	Admission ..	M.	35	101°	131	+	Fair.	III	—	9	Infil. of cords.	Arrest.	Progressive.
	Discharge...	..	..	100.3°	129	+	Fair.	III	—	..			
29	Admission ..	M.	27	99.4°	147	+	Good.	III	—	8	General infil.	Arrest.	Arrest.
	Discharge ..	..	..	N.	174	+	Good.	II	—	..			
30	Admission ..	M.	31	99.3°	124	+	Poor.	III	—	7	Inf. cords, false cords, and post. wall.	Arrest.	Improved.
	Discharge...	..	..	99.3°	140	+	Good.	III	—	..			
31	Admission ..	M.	37	99.3°	126	+	Poor.	III	—	11	General inf. except the epiglottis.	App. cure.	Arrest.
	Discharge...	..	..	N.	134	+	Good.	III	—	..			
32	Admission ..	M.	30	101°	127	+	Fair.	III	—	10	Infil. of cords.	Arrest.	Progressive.
	Discharge...	..	..	99.3°	128	+	Fair.	III	—	..			
33	Admission ..	M.	39	100.2°	130	+	Poor.	III	—	5	General infil.	Progressive.	Progressive.
	Discharge...	..	..	100°	126	+	Poor.	III	—	..			

NON-ULCERATIVE TUBERCULOUS LARYNGITIS.—(*Continued.*)

Case.		Sex.	Age (Years).	Temperature.	Weight.	T. P. S.	General Condition.	Pulmonary Lesion.	Pain.	Time (Months).	Laryngeal Lesion on Admission.	Laryngeal Result.	General Result.
34	Admission ..	M.	30	100.1°	141	+	Good.	III	—	12	Infil. rt. cord and arytenoids.	App. cure.	Improved.
	Discharge...	..	..	N.	146	+	Good.	III	—	..			
35	Admission ..	M.	52	101°	125	+	Poor.	III	—	4	Infil. left cord.	Progressive.	Progressive.
	Discharge...	..	..	99.4°	122	+	Poor.	III	—	..			
36	Admission ..	M.	27	100.1°	120	+	Bad.	III	—	2	Infil. arytenoids and epiglottis.	Progressive.	Progressive.
	Discharge...	..	..	100.3°	116	+	Bad.	III	—	..			
37	Admission ..	F.	36	N.	103	+	Poor.	III	—	18	Infil. cords, post. wall and arytenoids.	App. cure.	App. cure.
	Discharge...	..	..	N.	150	—	Good.	II	—	..			
38	Admission ..	M.	32	100°	131	+	Fair.	III	—	13	Infil. left cord.	App. cure.	Improved.
	Discharge...	..	..	N.	133	+	Fair.	III	—	..			
39	Admission ..	M.	29	101°	119	+	Bad.	III	—	3	General infil. except epiglottis.	Improved.	Progressive.
	Discharge...	..	..	102°	96	+	Bad.	III	—	..			
40	Admission ..	M.	31	100.1°	117	+	Poor.	I	—	20	Infil. rt. cord.	App. cure.	App. cure.
	Discharge...	..	..	N.	150	—	Good.	I	—	..			
41	Admission ..	M.	28	100.1°	135	+	Fair.	III	—	3	Infil. of cords.	Arrest.	Arrest.
	Discharge...	..	..	N.	148	+	Good.	III	—	..			
42	Admission ..	M.	41	100°	127	+	Poor.	III	—	6	General infil. except epiglot.	Improved.	Improved.
	Discharge...	..	..	100°	147	+	Good.	III	—	..			
43	Admission ..	M.	25	100°	137	+	Fair.	III	—	5	Infil. of cords.	App. cure.	Improved.
	Discharge...	..	..	N.	137	+	Fair.	III	—	..			
44	Admission ..	M.	20	99.4°	105	+	Poor.	I	—	18	Infil. cords and arytenoids.	App. cure.	App. cure.
	Discharge...	..	..	N.	136	—	Good.	I	—	..			

NON-ULCERATIVE TUBERCULOUS LARYNGITIS.—*(Continued.)*

Case.		Sex.	Age (Years).	Temperature.	Weight.	T. P. S	General Condition.	Pulmonary Lesion.	Pain.	Time (Months).	Laryngeal Lesion on Admission.	Laryngeal Result.	General Result.
45	Admission ..	F.	42	102°	110	+	Poor.	III	—	16	Infil. of cords.	Arrest.	Improved.
	Discharge...	..	..	99.2°	121	+	Fair.	III	—	..			
46	Admission ..	M.	27	99.1°	159	+	Good.	III	—	6	Infil. cords and false cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	168	+	Good.	III	—	..			
47	Admission ..	F.	30	N.	130	+	Good.	I	—	15	Inf. left cord.	App. cure.	App. cure.
	Discharge...	..	..	N.	140	—	Good.	I	—	..			
48	Admission ..	M.	30	101.4°	120	+	Fair.	II	—	7	Inf. of cords and post. wall.	Progressive.	Progressive.
	Discharge...	..	..	100°	117	+	Poor.	II	+	..			
49	Admission ..	M.	20	102°	129	+	Poor.	III	—	24	Infil. of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	157	—	Good.	II	—	..			
50	Admission ..	M.	31	101°	114	+	Poor.	II	—	16	Infil. of cords.	Progressive.	Progressive.
	Discharge...	..	..	100°	100	+	Bad.	III	+	..			
51	Admission ..	M.	37	99.1°	129	+	Good.	III	—	14	Infil. of cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	150	+	Good.	III	—	..			
52	Admission ..	M.	29	99.4°	126	+	Fair.	II	—	20	General infil.	Arrest.	Progressive.
	Discharge...	..	..	N.	126	+	Fair.	III	—	..			
53	Admission ..	M.	20	99.4°	150	+	Good.	III	—	10	Inf. arytenoids and epiglottis.	Improved.	Improved.
	Discharge...	..	..	99.1°	149	+	Good.	III	—	..			
54	Admission ..	F.	21	99°	120	+	Good.	I	—	19	Infil. of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	130	—	Good.	I	—	..			
55	Admission ..	M.	20	101°	128	+	Poor.	III	—	18	Infil. of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	154	—	Good.	II	—	..			

NON-ULCERATIVE TUBERCULOUS LARYNGITIS.—(*Continued.*)

CASE.		SEX.	AGE (YEARS).	TEMPERATURE.	WEIGHT.	T. P. S.	GENERAL CONDITION.	PULMONARY LESION.	PAIN.	TIME (MONTHS).	LARYNGEAL LESION ON ADMISSION.	LARYNGEAL RESULT.	GENERAL RESULT.
56	Admission ..	M.	20	99°	140	+	Good.	III	—	8	Infil. of cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	147	+	Good.	III	—	..			
57	Admission ..	M.	33	99.1°	126	+	Poor.	III	—	5	Infil. of cords.	Improved.	Improved.
	Discharge...	..	..	99°	137	+	Good.	III	—	..			
58	Admission ..	M.	19	101°	130	+	Good.	III	—	9	Infil. cords and false cords.	App. cure.	Improved.
	Discharge...	..	..	N.	131	+	Good.	III	—	..			
59	Admission ..	M.	20	101°	111	+	Fair.	I	—	16	Infil. cords and rt. arytenoid.	App. cure.	App. cure.
	Discharge...	..	..	N.	137	—	Good.	I	—	..			
60	Admission ..	M.	23	101.1°	127	+	Poor.	III	—	17	Inf. cords and posterior wall.	App. cure.	App. cure.
	Discharge...	..	..	N.	148	—	Good.	II	—	..			
61	Admission ..	M.	19	99°	116	+	Poor.	II	—	2	Inf. rt. cord.	Progressive.	Progressive.
	Discharge...	..	..	N.	125	+	Poor.	III	—	..			
62	Admission ..	M.	33	100°	125	+	Fair.	II	—	9	Infil. cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	131	+	Good.	I	—	..			
63	Admission ..	M.	30	99.3°	119	+	Fair.	II	—	13	Infil. left cord.	App. cure.	Arrest.
	Discharge...	..	..	N.	123	+	Fair.	II	—	..			
64	Admission ..	M.	34	N.	127	+	Poor.	II	—	12	Infil. of cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	131	+	Good.	II	—	..			
65	Admission ..	M.	46	N.	151	+	Good.	II	—	16	Infil. rt. cord.	App. cure.	Arrest.
	Discharge...	..	..	N.	170	+	Good.	II	—	..			
66	Admission ..	M.	32	N.	140	+	Good.	II	—	7	Infil. of cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	161	+	Good.	II	—	..			

NON-ULCERATIVE TUBERCULOUS LARYNGITIS.—(*Continued.*)

Case.		Sex.	Age (Years).	Temperature.	Weight.	T. P. S.	General Condition.	Pulmonary Lesion.	Pain.	Time (Months).	Laryngeal Lesion on Admission.	Laryngeal Result.	General Result.
67	Admission ..	M.	19	99°	136	+	Good.	I	—	15	Infil. of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	156	—	Good.	I	—	..			
68	Admission ..	F.	47	101°	100	+	Poor.	III	—	18	Infil. of cords.	Improved.	Improved.
	Discharge...	..	..	99.3°	111	+	Poor.	III	—	..			
69	Admission ..	M.	25	99.4°	137	+	Good.	I	—	11	Infil. of cords and post. wall.	App. cure.	App. cure.
	Discharge...	..	..	N.	153	—	Good.	I	—	..			
70	Admission ..	M.	26	100.3°	118	+	Poor.	II	—	3	Infil. of cords.	Progressive.	Progressive.
	Discharge...	..	..	N.	136	+	Good.	III	—	..			
71	Admission ..	M.	25	100.1°	121	+	Good.	II	—	12	Infil. left wall. Infil. cords.	App. cure.	Arrest.
	Discharge...	..	..	N.	125	+	Good.	I	—	..			
72	Admission ..	M.	32	N.	123	+	Good.	II	—	6	Infil. left cord.	App. cure.	Arrest.
	Discharge ..	..	..	N.	127	+	Good.	II	—	..			
73	Admission ..	M.	22	99.2°	142	+	Good.	I	—	12	Inf. of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	147	—	Good.	I	—	..			
74	Admission ..	M.	25	100°	117	+	Poor.	III	—	14	Inf. of cords, cyst of epiglot.	Improved.	Improved.
	Discharge...	..	..	99.3°	128	+	Good.	III	—	..			
75	Admission ..	M.	29	101.3°	110	+	Bad.	I	—	19	Infil. of cords.	App. cure.	App. cure.
	Discharge...	..	..	N.	149	—	Good.	I	—	..			

QUELQUES MOTS SUR LA CONSTRUCTION DES SANATORIUMS D'ALTITUDE POUR TUBERCULEUX.

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Emplacement.—Une fois que les observations météorologiques ont démontré qu'une localité d'altitude réunissait les conditions de climat demandées pour l'établissement d'un sanatorium, il reste à déterminer l'emplacement exact où s'élèvera la construction elle-même.

Sauf conditions spéciales, on écartera tout d'abord les terrains plats situés dans le fond d'une vallée; ces emplacements sont souvent marécageux et le drainage en est difficile.

On cherchera au contraire à placer l'édifice projeté sur le flanc d'une montagne exposée au sud; la façade principale en plein midi pour obtenir toute l'insolation possible. La position doit être aussi abritée contre les vents régnants et si possible dans le voisinage de forêts offrant des buts de promenade pour les malades.

Cette position en pente facilite l'écoulement des eaux et la période de fonte des neiges y est réduite à son minimum; l'évacuation des eaux ménagères et des égoûts est facile. En outre il fait moins froid en hiver sur les pentes que dans le fond des vallées.

Disposition du Plan.—L'expérience a prouvé que, pour bien remplir son but, le plan d'un sanatorium pour tuberculeux devait avoir beaucoup d'analogie avec celui d'un hôtel, en y ajoutant cependant certaines installations spéciales telles que galeries de cure d'air, appareils de désinfection, cabinet de consultation et laboratoire pour le docteur et son assistant.

Pour faire un tout complet, d'une administration facile et permettant un service médical rationnel, le sanatorium doit contenir de 100 à 120 lits pour ses hôtes et une quarantaine de lits pour le personnel. Le docteur ou, tout au moins son assistant, doit avoir son appartement dans la maison même, ainsi que le gérant.

Air, lumière et soleil; ce sont trois mots que le constructeur d'un sanatorium doit avoir toujours présents à la mémoire lors de l'élaboration de ses plans.

La façade principale doit être placée en plein midi, de façon à ce que toutes les chambres de malades aient leurs croisées largement ouvertes pour

laisser pénétrer l'air et le soleil. Un large couloir, aéré aux deux extrémités et si possible encore par des fenêtres au milieu de sa longueur, doit s'étendre d'une extrémité de la construction à l'autre. La partie au nord du couloir sera réservée à la cage d'escalier, aux offices, aux chambres de domestiques, aux cabinets, salles de bain et autres locaux accessoires.

Les cuisines et la salle à manger seront autant que possible placées en dehors du bâtiment et du côté opposé au vent dominant pour éviter toute odeur.

Les chambres destinées aux malades doivent avoir de larges baies descendant jusqu'au sol; certaines pièces auront des balcons, d'autres seront précédées de galeries larges qui serviront à la cure d'air.

En communication directe avec le bâtiment principal on établira aussi des galeries pour la cure d'air destinée aux personnes qui désirent faire leur cure en commun. Des vestiaires seront aménagés à proximité de ces galeries; autant que possible il y sera fait plusieurs entrées et elles seront divisées en travées par des cloisons à mi-hauteur afin d'éviter de déranger les malades étendus sur leurs chaises longues en passant devant eux.

La plupart des malades arrivent seuls; on fera donc la plus grande partie des chambres à un lit; pour les malades accompagnés il sera bon d'avoir quelques chambres à deux lits ou mieux encore des chambres à un lit communiquantes. Dans les établissements destinés à une clientèle plus riche, il est à conseiller d'aménager dans une des ailes du Sanatorium de petits appartements privés avec toutes leurs dépendances, W. C. salles de bain, etc. Ces appartements seront loués à des familles, qui tout en désirant profiter des facilités de la vie du Sanatorium, tiennent à rester le plus possible chez elles.

Enfin il pourra aussi être construit dans les environs des Sanatoriums des villas pour les familles qui ont l'intention d'avoir leurs domestiques et d'être à leur propre ménage; mais ce sont là des cas plutôt exceptionnels et l'expérience a bien prouvé que la plupart des malades préfèrent habiter le Sanatorium proprement dit où ils vivent en société et à proximité de leur docteur.

L'architecte ne devra pas non plus oublier de prévoir dans son plan les locaux de réunion nécessaires pour une agglomération d'une centaine de personnes qui doivent passer plusieurs mois ensemble; il sera donc nécessaire d'aménager des salles de lecture, une bibliothèque, une salle de billard et un grand hall ou salon de conversation où l'on se réunira après les repas et avant de se rendre à la galerie de cure d'air.

Matériaux a Employer.—Un Sanatorium habité par un grand nombre de malades devrait être construit en matériaux absolument insonores, de façon à ce que le bruit en puisse se propager ni d'un étage ni d'une chambre à l'autre.

Les parois, planchers et plafonds seront revêtus en matières imperméables et lavables afin de pouvoir désinfecter facilement toutes les pièces; tous les angles seront arrondis.

Ces conditions bien simples en apparence, lorsqu'on veut y conformer la construction des Sanatoriums, donnent lieu dans la pratique à de nombreuses difficultés et renchérissent le bâtiment d'une façon notable.

En tout état de cause on emploiera le moins possible le bois pour les parois, les poutraisons, ainsi que pour les planchers; le bois en effet est bon conducteur du son, il travaille beaucoup, se fendille, et ses joints forment des réceptacles de poussière et de microbes impossibles à désinfecter.

Il sera donc indiqué de construire en briques ou mieux encore en pierre. Les murs seront épais, les pièces seront séparées par des parois doubles ou des murs pleins; des double portes seront établies entre toutes les pièces et entre les pièces et les couloirs.

Les poutraisons seront faites en béton armé avec double plafond isolé; les sols seront dallés ou faits en mosaïque. Dans les pièces habitées il est à conseiller de recouvrir le sol d'un linoleum collé sur une composition spéciale (liégite, scheja, etc.). Ce linoleum doit être relevé contre les parois en s'arrondissant en forme de gorge, de façon à faire soubassement.

Les parois des chambres habitées seront recouvertes d'un enduit dur, peint à l'huile ou au ripolin; elles peuvent aussi être revêtues de toiles peintes et lavables (salubra).

On peut aussi combiner les deux systèmes en faisant au bas des pièces un soubassement en peinture et en revêtant la partie supérieure des parois de toiles peintes. Les angles doivent être arrondis.

Aménagements Divers.—Comme nous l'avons dit plus haut un sanatorium a beaucoup d'analogie avec un hôtel ordinaire; il s'en distingue cependant par le fait qu'il doit y habiter des malades destinés à y faire un séjour le plus souvent de longue durée.

Les chambres à coucher devront donc être confortables, pourvues d'armoires. Les dimensions de 5m. 50 de longueur sur 3m. 20 de largeur pour les chambres à un lit est très suffisante pour pouvoir les meubler d'une façon confortable. Dans les sanatoriums d'altitude la hauteur de plancher à plafond a été reconnue suffisante à 3 mètres. Une plus grande hauteur nécessiterait un chauffage plus dispendieux en augmentant sans utilité le cube d'air de la pièce, cube bien suffisant, surtout si l'on tient compte du fait que les malades sont d'ordinaire toute la journée hors de leur chambre sur la galerie de cure d'air et qu'ils dorment la nuit avec le vasistas de la fenêtre entr'ouvert.

Un office en communication directe avec la cuisine à café doit être aménagé à chaque étage pour le service en chambre, une partie des malades prenant le premier déjeuner dans leur lit; il faut être aussi organisé pour

servir à chaque étage des repas entiers, soit pour les familles qui désirent prendre leurs repas dans leur appartement, soit pour les personnes alitées ou obligées de rester en chambre.

Le service médical doit être facilité dans la mesure du possible.

Si le docteur ne loge pas dans la maison même, il doit y avoir son cabinet de consultation avec une chambre d'attente annexée.

On lui aménagera aussi un laboratoire d'analyses.

Si le médecin principal a un ou plusieurs assistants, l'un d'eux devra en tout état de cause avoir sa chambre dans la maison principale, ainsi que son cabinet de consultation particulier.

Des bains et douches doivent encore être annexés au service médical.

Pour avoir une installation complète il est nécessaire d'installer dans le voisinage immédiat du bâtiment principal une chaudière à vapeur à haute pression; cette chaudière fournira la vapeur nécessaire à un autoclave pour la désinfection des crachoirs de poche, pour le service de l'eau chaude des bains et douches et pour la vapeur nécessaire pour cuire dans des appareils spéciaux le café et faire bouillir le lait.

Le chauffage de tous les locaux sera central à eau chaude, ce système permettant un réglage facile et donnant une température très douce; il présente cependant l'inconvénient de permettre le gel dans les corps de chauffe laissés fermés dans les grands froids.

Cette considération dans les sanatoriums d'altitude, a fait quelquefois préférer le chauffage central à la vapeur plus énergique et ne craignant pas le gel.

Le chauffage au moyen de l'electricité serait intéressant à essayer, mais jusqu'à présent en Europe la force électrique est trop chère pour pouvoir être appliquée pratiquement au chauffage.

Les pièces de réception, salle à manger, hall, salon, etc., doivent être hautes et très bien ventilées; les malades habitués à rester en plein air souffrent très rapidement du séjour dans un local fermé et chaud.

Cette ventilation sera obtenue par des ventilateurs à ailettes donnant sur l'extérieur, par les impostes de fenêtres et par des canaux de ventilation dans les murs, partant du plafond des salles et débouchant sur les toitures. Pour produire un bon effet les ventilateurs à ailettes doivent actionnées par un moteur et les canaux de ventilation doivent être pourvus d'un mode d'appel (bec de gaz, etc.) pour éviter les retours d'air.

L'air frais entrant dans les salles sera réchauffé en passant à travers les radiateurs de chauffage central ou pénétrera dans les pièces par des registres après avoir été réchauffé par des corps de chauffe spéciaux.

L'expérience a prouvé qu'en ce qui concerne la ventilation des chambres à coucher, il faut tenir compte du fait que les malades dorment presque toujours avec la fenêtre entr'ouverte.

Il n'est donc pas nécessaire de faire dans les murs des canaux de ventilation que les malades laissent presque toujours fermés, qui fonctionnent souvent en sens inverse en amenant de l'air froid dans les pièces au lieu d'évacuer l'air vicié; il est au contraire à conseiller de laisser descendre les baies jusqu'au plancher de la pièce et de placer au-dessus des fenêtres des impostes ouvrants solidaires pour la fenêtre et la double fenêtre et que le malade laisse ouverts pendant la nuit.

Le radiateur de chauffage central sera placé à l'extrémité opposée de la pièce, près de la porte donnant sur le corridor; il se produit ainsi un mouvement d'air continu qui renouvelle sans courant l'air de la pièce.

L'éclairage du Sanatorium sera fait à l'électricité; les chambres à coucher auront des lampes alternatives permettant aux malades de lire dans leur lit; les galeries de cure d'air seront aussi bien éclairées afin de permettre le séjour pendant les heures de la soirée.

Le mobilier des chambres sera susceptible de désinfection, comme les parois et le plancher des pièces; pas de tapis ni de tentures, des lits en fer, des meubles simples et lavables, sans moulures, aux angles arrondis. Les chaises seront cannées. Les meubles rembourrés seront recouverts de housses lavables et désinfectables.

Les eaux d'égoût seront conduites dans des fosses Mouras de manière à en faire l'épuration bactérienne pour détruire les bacilles.

Enfin il sera nécessaire d'avoir à proximité du Sanatorium une étuve à désinfection assez grande pour pouvoir désinfecter, au moyen de la vapeur à haute pression la literie et le linge des malades.

Nous espérons avoir donné ainsi en peu de lignes quelques renseigements relatifs à la construction des sanatoriums d'altitude pour tuberculeux; il va de soi que chaque jour on fait de nouveaux progrès et qu'un sanatorium considéré aujourd'hui comme modèle, sera probablement très demodé dans une vingtaine d'années. Une expérience acquise dans la construction des cinq sanatoriums de Leysin, montre que, dans chaque cas particulier de nouvelles études et des dispositions spéciales sont nécessaires, mais il n'en reste pas moins vrai que l'architecte doit avoir un fil directeur pour son travail et qu'il ne doit jamais perdre de vue les lois de l'hygiène qui sont à la base de tout projet rationnel.

Le constructeur doit aussi savoir se servir des matériaux à sa portée; chaque pays a des modes de construction différents; c'est une erreur de vouloir utiliser dans d'autres climats des matériaux qui y sont inconnus: ou bien ces produits, travaillés par des mains inhabiles, ne donnent pas les résultats attendus, ou tout au moins le coût de la construction sera élevé dans une proportion qui ne sera pas en rapport avec les avantages obtenus.

Dans toutes ses études et pendant la durée de la construction, l'architecte, même le plus entendu, a besoin d'être conseillé et dirigé par le médecin qui devra plus tard prendre la direction de l'établissement.

INDICATIONS ET CONTREINDICATIONS PRATIQUES DU CLIMAT D'ALTITUDE.

Par Dr. Th. Exchaquet,
Médecin Directeur du Sanatorium, Grand Hotel de Leysin.

Lorsque je fut appelé autrefois à prendre la direction d'un sanatorium d'altitude, un maître et ami me disait: "Il nous manque quelquechose de précis sur les indications des climats d'altitude, vous nous les donnerez dans quelques années." C'est ce que je voudrais chercher à faire ici en m'appuyant uniquement sur les observations de la pratique. Je laisserai donc de côté les théories et les considérations générales sur l'action de l'altitude ainsi que les travaux scientifiques sur ce sujet, et demanderai la permission de donner seulement l'impression personnelle et les conclusions qui dégagent pour moi de douze années de pratique à une altitude moyenne d'environ 1400 mètres.

Et d'abord un aveu: Il me parait de moins en moins légitime et conforme aux faits, d'établir dans ce domaine les divisions rigoureuses et purement schématiques qu'on voudrait nous demander de créer. Si l'on renonce en thérapeutique à la médecine des équations (tel symptôme-tel médicament) on ne peut non plus conclure absolument de telle forme ou de tel symptôme isolé au choix ou au rejet de tel ou tel climat. Encore moins faut-il toujours opposer l'altitude aux climats de plaine ou aux climats marins, alors qu'ils présentent tant de facteurs communs et, par conséquent, d'indications communes.

Il ne semble pas non plus que la classification anatomo-pathologique, bien que séduisante, puisse être d'un grand secours dans le choix d'un climat, pas plus qu'elle ne l'est souvent en réalité pour le pronostic. Nous ignorons en effet pourquoi tel cas grave guérit, pourquoi tel autre, à lésions minimes, résiste à tous les traitements et aboutit, malgré tout, à la phtisis confirmée et incurable. Il est donc difficile, pour les indications surtout, de sortir des généralités plus ou moins banales données habituellement comme seules indications: formes torpides, apyrétiques, cas au début ou à marche chronique. Il est évident que l'altitude convient dans toutes ces formes qui guérissent, ou peuvent guérir, partout et que tous les climats peuvent réclamer.

Mais l'altitude me parait indiquée aussi, le plus souvent, dans les cas plus

graves à début aigu et à marche fébrile, oú la fièvre d'invasion, le ramollissement même ont fait une apparition précoce. On obtient souvent dans ces cas un arrêt plus ou moins rapide de la maladie. Le plus souvent les sueurs nocturnes cédent spontanément en quelques jours, les malades se à manger, les forces se relévent et les formes les plus aiguës paraissent souvent tourner court. Ces améliorations rapides se sont mettent évidemment ni constantes ni définitives; mais elles permettent du moins d'entreprendre, dans des conditions meilleures, une lutte qui ne peut aboutir qu'à force de patience, de persévérance et de volonté soit chez le malade soit chez ceux qui l'entourent. On pourrait résumer les indications positives ou relatives en disant que, si la montagne n'est spécifique d'aucune forme spéciale, on peut en faire l'essai dans tous les cas où il y a encore assez de vitalité et de résistance pour qu'il reste des chances de triompher du mal ou d'en enrayer la marche.

Si les indications restent ainsi, pour nous, forcément un peu générales il serait plus important, pour les malades comme pour les médecins, de pouvoir préciser mieux les formes ou les symptômes qui doivent être considérés comme des contreindications à la cure d'altitude. Reprenons un peu celles qui sont acceptées en général par le public et par les médecins.

Il faut en signaler tout d'abord une qui parait étrange à une époque qui s'est distinguée par la recherche et le dépistage des symptômes de début et des premiers stades de la tuberculose. Beaucoup de médecins sérieux paraissent croire qu'il ne vaut pas la peine d'envoyer à l'altitude et surtout dans un sanatorium les cas légers, encore au début. J'ai vu bien des malades auxquels on avait dit, "vous n'avez presque rien, ce n'est pas la peine d'aller à la montagne, vous pouvez vous soigner chez vous," ou "quitter Paris, allez passer deux ou trois mois à la campagne (ou dans le midi suivant la saison) vous vous ennuyerez moins." Et un an ou deux plus tard ces malades nous arrivent avec des lésions assez avancées pour mettre en question la possibilité d'une guérison qu'un traitement sérieux et rationnel aurait presque certainement permis, au début, d'obtenir en quelques mois.

S'il ne s'agit pas ici d'une question de climat spécial, on ne saurait trop redire que si la tuberculose est curable, elle ne l'est le plus souvent qu'à la condition d'être soignée sérieusement dès qu'elle est reconnue, que les demi-mesures font perdre un temps précieux et qu'il y a avantage pour tous les malades à se placer d'emblée dans les milieux où ils trouveront, si possible avec les avantages d'un climat favorable, la surveillance constante nécessaire au début pour leur éducation médicale.

Eréthysme-Hémoptysies.—La plupart des auteurs s'accordent à répéter que les formes dites erétyques ou congestives, et surtout les hémoptysies constituent une contreindication positive pour les climats d'altitude. Dans ces formes erétyques qui répondent à un type fréquent, quoique un peu

vague comme définition, je n'ai jamais vu d'accidents sérieux qu'on pût attribuer à l'altitude. On voit sans doute survenir des poussées congestives, souvent sans cause appréciable, de préférence sans doute chez les malades qui se fatiguent ou qui se suralimantent avec excès. Mais ces poussées ne paraissent certainement pas se produire plus fréquemment à l'arrivée lorsqu'on fait observer aux malades les précautions nécessaires et qu'on les met au repos pendant la période d'acclimatement. Et s'il est vrai que la toux et l'expectoration augmentent parfois au début du séjour dans les formes torpides, sous l'influence du coup de fouet donné à l'organisme par le changement de climat, on voit au contraire souvent diminuer, dès l'arrivée, la toux d'irritation, inutile et séche, si fréquente chez les malades dits congestifs.

Hémoptysies.—Il en est de même des hémoptysies et surtout des hémoptysies à répétition si particulières à certains malades. Elles ne paraissent pas favoriser par l'altitude pourvu qu'on maintienne au début les malades au repos complet. J'ai vu une fois seulement un malade atteint d'hémoptysie grave dès son arrivée. C'était dans le temps où l'on n'arrivait encore à Leysin qu'en voiture. Il était arrivé après une nuit de chemin de fer, enveloppé de fourrures parcequ'on était en hiver, mais exposé directement au soleil pendant trois ou quatre heures. Une statistique déjà ancienne, et qui porte sur un très grand nombre de malades, a démontré du reste, pour Davos, que les malades qui avaient eu des hémoptysies à la plaine n'en avaient pas davantage après s'être installés à la montagne, et que la proportion des malades qui en avaient pour la première fois à la montagne ne dépassait pas le taux général. Il est du reste bien difficile, sauf lorsqu'ils sont chez les femmes, en rapport avec le travail de la menstruation, de pouvoir déterminer chez les malades hémoptoïques la raison apparente ou la cause déterminate de ces accidents.

Tachycardie.—La tachycardie, si souvent observée comme signe de début de la tuberculose pulmonaire, est aussi regardée par beaucoups de médecins comme une contreindication presque absolue. Cela parait vrai dans les formes très accusées ou le pouls dépasse habituellement 100 par minute le matin et au repos. En général ce signe, comme tout indice de faiblesse ou d'intoxication générale, a de l'importance au point de vue du régime à suivre (repos, évitation des fatigues physiques et des excitations nerveuses) mais il n'empêche pas les malades de bénéficier de la cure d'altitude et il s'atténue souvent avec le relèvement de l'état général.

Tous les troubles circulataires, tout ce que touche au coeur, est du reste, en France surtout, en vertu de considérations théoriques, l'objet de craintes manifestement exagerées à l'égard de l'action de l'altitude. Ce n'est pas ici le lieu de traiter cette question, mais je crois pouvoir affirmer que, pourvu qu'on évite la fatigue et l'effort, qu'il s'agisse de malades encore résistants ou

de personnes agées, on peut supporter sans inconvénients pour le coeur la diminution de pression qui correspond aux altitudes moyennes où l'on traite ordinairement les maladies de poitrine.

Il en est tout autrement, cela va sans dire, lorsque l'effort entre en jeu pour y parvenir ou que le dénivellement est rapide. Ici encore les précautions à prendre ne doivent pas être prescrites de façon à devenir un danger de plus. Le séjour dans une station intermédiaire entre la plaine et la montagne, qu'on conseille souvent, peut être utile sans doute, mais à la condition de se trouver sur la route qui conduit à la station la plus elevée. Par contre il me semble peu logique, sinon toujours dangereux, d'envoyer les malades comme je le vois faire souvent, passer un jour ou deux à 900 ou 1000 m., pour éviter de monter d'un seul coup à 1400, alors que pour aller d'une station à l'autre ils doivent redescendre d'abord à 400 m. et supporter ainsi coup sur coup une descente de 600 m., puis la montée de 1000 mètres qu'on voulait leur éviter.

Fièvre.—On craint en général l'action de l'altitude dans les formes fébriles d'emblée ou chez les malades chez lesquels la fièvre est un symptôme habituel et persistant. L'expérience des médecins d'altitude voit au contraire dans ces formes ses succès les plus frappants. Chez beaucoup de ces malades (influenza prolongée, bronchopneumonies secondaires, pneumonies grippales qui ne se résolvent pas, pneumonies caséeuses) les températures elevées qui duraient depuis de mois cédent parfois en quelques jours. Les deux courbes ci-jointes prises parmi les malades en traitement au moment de la rédaction de ce travail montrent cette défervescence parfois plus rapide et plus typique encore.

Dans d'autres cas, où la fièvre est plus tenace, le changement d'air relève cependant l'état général et l'on voit les malades augmenter de poids malgré la persistance de la fièvre. Avec des températures qui dépassent encore 38°, malgré le sejour au lit, avec trois repas seulement, je relève chez deux malades arrivés il y a un mois les poids hebdomadaires suivants:

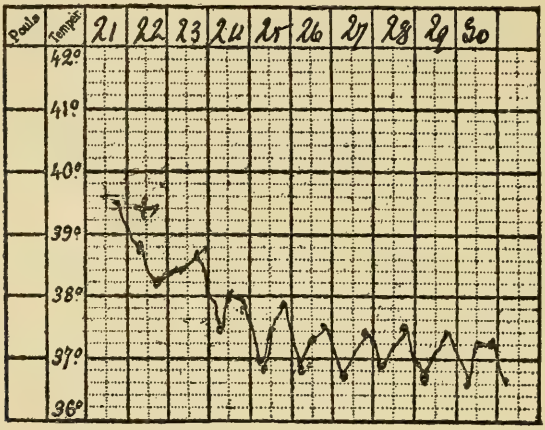
Premier cas. Catarrhe étendu, bilateral, surmenage, poussée bronchitique en Mars. A l'arrivée poids 52 kgr. 700; puis 54 kgr. 700; 55 kgr. 300; 56 kgr. 300.

Second cas. Infiltration du sommet gauche, pleurésie récente en résolution lente. Première pesée au bout d'une semaine—51 kgr. 900; 2de. pesée 53 kgr.; 3 eme. pesée 53 kgr. 600; 4 eme. pesée 55 kilogs.

Les faits de ce genre donne l'audace et j'ose dire, comme je le pense, que la meilleure chance à donner à ces malades, est de les sortir de leurs appartements de ville malgré leur fièvre et de les mettre à l'air dès que leur transport est matériellement possible. Je ne prétends pas évidemment qu'ils guériront tous. Si la fièvre persiste sans que des progrès locaux s'affirment ou sans

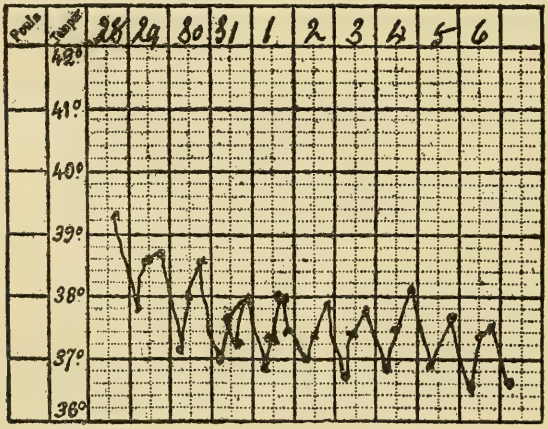
que la nutrition et les forces se relèvent assez pour donner quelque espoir, il peut y avoir avantage à ne pas prolonger indéfiniment le séjour à l'altitude. Il semble que ces grands consomptifs y brulent peut-être plus vite qu'ailleurs,

MOIS DE AVRIL, 1908.



Observations. X——, masculin, 22 ans. Température buccale entre 38 et 39 depuis deux mois malgré l'usage constant d'antithermiques supprimés dès l'arrivée. +, Arrivé.

MOIS DE MAI–JUIN, 1908.



Observations. Z——, masculin, 20 ans. Arrivé le 28 Mai. Bronchopneumonie grippale-bacillaire.

c'est du moins, à défaut de preuves scientifiques, l'opinion d'observateurs, médecins et gardes-malades, dont l'expérience n'est pas à dédaigner. Encore ne faut il pas les décourager trop tôt; on voit guérir et reprendre une vie

normale, des malades chez lesquels la défervescence compléte s'est fait attendre six mois et plus.

Quelques chiffres à l'appui de ces affirmations. En relevant les observations des malades entrés au sanatorium avec de la fièvre pendant les cinq dernières années je trouve les chiffres suivants:

Sur 94 malades présentant à l'entrée une température de 38.5° et audessus, 36 étaient encore à leur sortie ou à leur mort audessus de 38.5°, 12 avaient des températures encore fébriles mais audessous de 38.5°, et 46 avaient une température normale.

De 144 malades entrées avec une température fébrile mais audessous de 38.5°, 11 avaient à la sortie plus de 38.5°, 21 étaient encore fébriles mais audessous de 38.5°, et 112 avaient une température normale.

En réunissant tous les cas, 66.4% sont donc revenus à une température normale. Et il faut noter qu'il ne s'agit pas ici d'une clientèle triée, comme dans les sanatoriums populaires, mais que nous recevons des malades à tous les degrés et dans le nombre beaucoup étaient arrivés au sanatorium en pleine hecticité pour y mourir après quelques semaines ou même quelques jours seulement.

Laryngite Tuberculeuse. Albuminurie.—Parmi les complications de la tuberculose pulmonaire, deux surtout passent pour se trouver mal de la montagne, les laryngites tuberculeuses et l'albuminurie. L'une et l'autre aggravent comme on le sait le pronostic de la tuberculose et ne constituent pas une clientèle très disirable. Je ne pense pas néanmoins qu'elles soient habituellement aggravées par l'altitude. J'ai vu guérir spontanément, en suite du relévement de l'état général, quelques cas de laryngites avec ulcérations. Nous avons souvent en séjour, entre les interventions chirurgicales, des malades du Dr. Mermod qui estime que ses malades peuvent retirer un bénéfice réel du climat. Mais il faut admettre d'autre part que en hiver surtout, la sécheresse extrême de l'air irrite facilement les larynx sensibles et que certains malades souffrent plus de leur gorge que dans les climats plus mous et plus humides.

Cette sécheresse de l'air est par contre ce qui permet aux albuminuriques de supporter sans inconvénients les froids de l'hiver. Mais pour les uns comme pour les autres il faut tenir compte surtout de l'ensemble des symptômes, et non d'un seul pour juger de l'opportunité d'un essai de séjour à l'altitude.

Asthme et Emphysème.—L'asthme est par nature capricieux et ne peut pas être soumis à une règle générale. Beaucoup d'asthmatiques, surtout ceux chez qui l'asthme precéde la tuberculose confirmée, sont complétement indemnes à la montagne; quelques malades la supportent mal, c'est avant tout affaire d'expérience individuelle.

Les emphysémateux sont naturellement plus essoufflés au début dans un

air rarefié qu'à la plaine. Dans les formes benignes, l'acclimatement une fois obtenu, le poumon parait regagner plus de tonicité et le thorax gagne en ampliation. L'emphysème très étendu, surtout s'il est déjà compliqué de dilatation du coeur droit, devient par contre une véritable contre-indication.

Formes chroniques anciennes.—Il en est de même des malades faibles, sans force de réaction contre le froid; des anciens malades dont une proportion considérable des poumons est inutilisable pour l'hématose (formes fibreuses) ou détruit comme chez les grands cavitaires plus ou moins asséchés et du reste afébriles. C'est aussi le cas des débiles constitutionnels dont la circulation périphérique est défectueuse et qui se cyanosent dès que la température extérieure s'abaisse. Il y a certainement avantage à envoyer ces malades, au moins pour l'hiver, dans les climats chauds, à température plus constante, où ils se conserveront probablement plus longtemps et où ils souffrent moins.

Insuffisance cardiaque.—A plus forte raison en est-il ainsi, et c'est là je crois la contreindication la plus positive de l'altitude, chez tous les malades dont le coeur commence à fléchir comme cela arrive chez les anciens malades ou chez les malades très intoxiqués dès le début de la maladie. Souvent, dans ces cas, des troubles nerveux, et en particulier une insomnie spéciale et tenace, précédent les grands accidents d'asystolie et peuvent servir d'avertissement. Mais trop souvent les symptômes graves surviennent brusquement, dès l'arrivée ou à la suite d'une petite hémoptysie, d'une poussée fébrile, et leur acuité est telle qu'aucun traitement ne peut en conjurer la marche fatale, ni laisser même le temps d'essayer d'un changement de climat.

Troubles nerveux et psychiques.—Notons enfin la difficulté qu'ont à s'acclimater certains malades nerveux et neurasthéniques. Les palpitations nerveuses, l'insomnie, l'ennui et la dépression mélancolique deviennent parfois assez accentués pour faire écourter le séjour à l'altitude. Malgré les ressources de la psychothérapie il faut quelquefois tenir compte du moral des malades et du sentiment de tristesse et d'écrasement que les montagnes inspirent parfois à certains citadins et aux malades qui n'ont pas l'énergie morale nécessaire pour réagir contre ces impressions maladives.

Je regrette, en arrivant au bout de cette étude, de ne pouvoir pas la résumer en formules précises qui ne me paraissent pas compatibles avec la complexité des faits. Mon but sera néanmoins atteint si les quelques jalons que j'ai cherché à poser peuvent servir d'indications pratiques et rouvrir la discussion sur des affirmations trop facilement acceptées par le grand nombre des médecins qui ne connaissent l'altitude que théoriquement et par les livres d'autrefois.

ASTHME ET TUBERCULOSE.

Par Dr. Leopold de Reynier,
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Jusqu'au milieu du siècle passé, la majorité des cliniciens étaient d'accord de voir dans l'asthme et la tuberculose deux maladies ne pouvant coexister simultanément chez le même individu, non seulement les asthmes étaient réfractaires à la tuberculose, mais encore l'asthme était un brevet de longue vie. Ni les découverts de Bayle en 1810, ni plus tard celles de Virchow, permettant post mortem le diagnostic sur la tuberculose pulmonaire, n'ont modifié d'une façon certaine—comme on aurait pu s'y attendre-cette manière de voir. Seul Trousseau considérait l'asthme et la tuberculose comme l'expression d'une même diathèse. Pour lui, des enfants tuberculeux peuvent naître de parents asthmatiques, et inversement des parents tuberculeux peuvent donner naissance à des enfants asthmatiques. Cruveilhier,[1] Andral,[2] Bayart,[3] Mairet,[4] décrivent pour la première fois une forme de tuberculose miliaire avec une dyspnée présentant tous les symptômes de l'asthme aiguë. D'autres vont plus loins. G. de Mussy entrevoit la vérité et reconnait que l'asthme et la tuberculose peuvent apparaître chez le même individu, mais trop attaché à la vieille théorie, il ajoute que comme ces deux affections sont antagonistes, l'invasion de l'asthme fait disparaître les manifestations de la tuberculose, et réciproquement.

De même Pujade[5] tout en reconnaissant la dyspnée de certaines formes de tuberculose miliaire aiguë, ne veut pas identifier à l'asthme les crises de dyspnée survenant au début de certaines tuberculoses pulmonaires, et il parle du pseudo-asthme du tuberculeux, il tire à la fin de la deuxième partie de son travail les conclusions suivants: "La tuberculose commune débute plusieurs fois par des accés de dyspnée intermittente, qui en l'absence d'autres symptômes, peuvent être confondus avec l'asthme proprement dit II. Ces accés de dyspnée pseudo asthmatiques peuvent également apparaître alors que la tuberculose est déjà depuis longtemps constituée en modifiant par leurs actions les allures et la marche de l'affection primitive."

Celles étaient les differentes manières de voir avant la découverte en 1881 du bacille de la tuberculose par Koch. Grâce à cette découverte, on se serait attendu à ce que la question de l'antagonisme, ou au contraire de l'dentité de l'asthme et de la tuberculose serait facilement établie. Mal-

heureusement, c'est tout le contraire qui s'est produit et il s'est formé deux camps diamétralement opposés. Les uns toujours fidèles à l'ancienne théorie ne peuvent admettre que l'asthme et la tuberculose coexistent chez le même individu. Tels sont: en Allemagne, Brugelmann[6]; en France, Sarda et Virés,[7] Grasset,[8] Rancoule[9]; en Suisse, Baur,[10] qui n'admettent que l'asthme par compression se manifeste à une période avancée, mais jamais au début.

Les autres par contre ne veulent voir dans n'importe quel asthme non symptomatique qu'un symptôme de la tuberculose. Tels entre autres en France, Landouzy[11] qui s'exprime ainsi: "Je crois que les asthmatiques vrais sont sujets à des accés de spasmes respiratoires parce qu'ils ont une épine tuberculeuse celle-ci conditionnant la névrose pulmonaire au même titre que telle lésion des fausses nasales." Reboule[12] dit dans ses conclusions: "Chez tous malades présentant des accés d'asthme qui ne paraissent pouvoir se rattacher à aucune des causes habituelles de l'asthme (nez, nasopharynx, coeur, reins, bronches, utérus) le médecin aura le droit de soupçonner une tuberculose lardée latente car la tuberculose peut ne se maifester à son début que par des accés d'asthme que nous appelons asthme prétuberculeux." En Angleterre, A. L. Jämes d'Edinbourg[13] considère la tuberculose comme une des terminations possible de l'asthme. En Amérique, William Osler[14] de Baltimore note comme premier symptôme possible de tuberculose un asthme avec poitrine sifflante et râles sibilants. En Uruguay, F. Socca[15] dit: "L'asthme est pour moi expression de tuberculose."

Comment expliquer cette différence d'opinion? Comment Brugelmann qui a examiné plusieurs milliers d'asthme peut-il écrire: "Ein asthma wärend seines Bestehens schliesst Tuberkulose aus," et F. Socca avec 2–3000 asthmes écrit: "Pour moi l'asthme est incontestablement expression de tuberculose."

Il semblerait cependant que grâce à nos moyens d'investigations, grâce surtout au microscope, une pareille divergence de vue devrait être impossible. C'est dans le but d'amener un peu de lumière dans cette question et de trouver un terrain de réconciliation entre les deux camps opposés que j'ai étudié les histoires de malades de 3018 tuberculeux, des sanatoriums de Leysin, Grand Hotel, Mont Blanc et Chamossaire, auxquelles j'ai ajouté mes observations personnelles soit durant mon séjour à Davos, soit ici à Leysin au Grand Hotel des Chamois, ou dans ma clientèle privée. Je saisis cette occasion pour présenter à MM. les Docteurs Exchaquet, Meyer, et Jaquerai l'expression de ma profonde reconnaissance pour leur complaisance et leur amabilité à me faciliter mes recherches. Mon sujet sera divisé en quatre:

1. L'asthme et la tuberculose sont ils l'expression d'une même diathèse?

2. Des rapports de la tuberculose avec l'asthme ayant éclaté dans la première enfance.

3. Asthme. Symptôme de tuberculose.
4. Asthme dans la tuberculose miliaire aiguë.

I.

L'Asthme et la Tuberculose sont ils l'Expression de la Même Diathèse.

Ainsi que je l'ai dit plus haut, Trousseau considérait l'asthme et la tuberculose comme l'expression d'une même diathèse. Pour lui des enfants tuberculeux peuvent naître de parents asthmatiques, et reciproquement des parents tuberculeux peuvent donner naissance à des enfants asthmatiques. Je crois d'après le résultat de nos recherches reposant sur plus de 3000 malades tuberculeux, pouvoir affirmer que cette assertion est fausse. En effet, sur plus de 3000 tuberculeux, je n'ai trouvé que 13 cas ayant une hérédité asthmatique; pas même dans $\frac{1}{2}\%$, alors que l'hérédité tuberculeuse est de plus de 50% (trois fois chez la mère, 8 fois chez le père, 2 fois dans la famille). Issu d'un père asthmatique nous n'avons rencontré dans deux cas seulement, dans un, deux descendants, dans l'autre, trois descendants tuberculeux. Si donc l'assertion de Trousseau était vraie et si surtout il en était comme Socca veut le prétendre, "l'intimité de l'asthme et de la tuberculose, la coincidence extrêmement fréquente de la tuberculose et de l'asthme chez l'individu ou dans la famille" notre pourcentage serait beaucoup plus élevé. Il est au contraire si minime que nous pouvons considérer la présence de l'asthme et la tuberculose dans une même famille comme une rare éventualité. On ne peut pas non plus d'un autre coté alléguer que les tuberculeux ignoraient peut être la présence de cette maladie chez leur parents, car l'asthme est une maladie à trop grand fracas pour passer inaperçue. La conséquence de cette affirmation est naturellement très importante, car le fait d'avoir un de ses parents, ou les deux, asthmatiques ne doit nullement influencer défavorablement une union, ni empêcher ou modifier une assurance vie ou maladie. Il nous est difficile d'émettre une opinion sûre concernant la prognose des tuberculeux ayant une hérédité asthmatique, car notre nombre de cas (13) est trop restreint; toutefois elle nous parait plus tôt favorable. En effet sur les 13 cas, 3 ont quitté Leysin dans le même état où ils étaient arrivés, 5 très améliorés, et 5 avec la guérison apparente. La deuxième partie de l'assertion de Trousseau que des tuberculeux peuvent engendrer des asthmatiques nous parait toute aussi fausse que la première, car nous n'avons pas noté un seul cas d'asthme chez un des descendants de nos tuberculeux.

Conclusion.—Il ne ressort de nos observations qu'il n'est pas admissible que l'asthme et la tuberculose soient l'expression d'une même diathèse, mais qu'au contraire il est très rare de voir un asthmatique engendrer des tuber-

culeux, et encore plus rare de voir des tuberculeux engendrer des asthmatiques.

II.

Des Rapports de la Tuberculose Avec l'Asthme Ayant Éclaté dans la Première Enfance.

Il peut sembler étrange de faire une distinction entre l'asthme essentiel éclatant dans la première enfance, et celui ne commençant que plus tard, soit dans l'âge mûre soit dans la vieillesse; mais en étudiant dans ses détails la manière dont ces deux espèces d'asthme se compose vis-à-vis de la tuberculose, on remarque immédiatement une telle différence que l'on se soit obligé de faire deux classes. Tandis que chez les premiers l'asthme et la tuberculose paraissent n'avoir aucun lien commun d'évoleur tout à fait indépendamment l'un de l'autre, chez les autres au contraire l'asthme parait être intimement lié à la tuberculose dont il n'est qu'un symptôme, comme la fièvre ou l'amaigrissement. C'est pourquoi il n'éclate qu'avec la tuberculose, s'améliore avec elle, pour disparaître avec sa guérison. Cette distinction entre ces deux espèces d'asthme nous parait donc de la plus grande importance, car à notre avis ce manque de distinction est la raison principale de la divergence d'opinion des deux camps opposés. En effet les uns ne considerant que les asthmes de l'enfance, déclarent qu'ils ne deviennent jamais tuberculeux; les autres au contraire, ne voyant que ceux chez lesquels l'asthme est un symptôme de la tuberculose, déclarent franchement tous les asthmes tuberculeux. Etudions donc en détail ces deux espèces d'asthme et nous verrons qu'ils n'ont absolument rien à faire ensemble.

Chez les asthmes de l'enfance, nous sommes frappés tout d'abord de voir combien il est rare qu'ils deviennent tuberculeux. En effet sur les 3018 tuberculeux je n'ai pu trouver que 4 cas, un peu plus de 1%. Si ce nombre est si restreint, c'est que je n'ai choisi dans les observations publiées ci-dessus que les cas présentant une tuberculose pulmonaire ouverte c.o.a. ceux chez lesquels des bacilles ont été trouvés dans l'expectoration. J'avais encore plusieurs autres cas présentant à l'auscultation des symptômes presque indubitables de tuberculose pulmonaire "matité, râles secs, hémoptysies, etc.," mais n'ayant jamais présenté de bacilles malgré des recherches nombreuses, que j'ai exclu de ce travail afin d'éviter toute discussion ou contreindication.

La théorie de Landouzy, Socca, Reboule, etc., qui est juste pour les asthmatiques dont l'asthme n'est qu'un essentiel symptôme de tuberculose, est fausse chez ceux dont l'asthme a éclaté dans la première enfance. En effet, s'il en était autrement nos cas seraient beaucoup plus nombreux; car les asthmatiques sont des malades qui consultent souvent des médecins, et ce qui est mieux, des spécialistes qui les enverraient naturellement dans

nos stations. Il faut donc admettre que l'asthme essentiel éclatant dans la première enfance, ne prédispose nullement à la tuberculose pulmonaire, et que la théorie des anciens citée plus haut, prétendant que l'asthme et la tuberculose ne pouvaient coexister simultanément chez le même individu, est, à quelques très rares exceptions pris, tout à fait vraie. Du reste, les plus fervents adeptes de la théorie de l'identité de l'asthme et de la tuberculose reconnaissent qu'un très grand nombre de cas font exception à leur théorie, ainsi Socca avoue qu'il lui a été impossible, dans environ 200 cas, de découvrir la plus petite relation entre l'asthme et la tuberculose, mais trop ancré dans son idée, il refuse à ces cas toute valeur démonstrative, et il persiste à voir dans tous les asthmatiques des tuberculeux présents ou futurs.

Mais ainsi que notre immense matériel nous a permis de constater, nous devons admettre que l'asthme essentiel de la première enfance ne préserve pas absolument de la tuberculose pulmonaire. En effet, dans certains cas, sans que les crises d'asthme aient cessé ni même diminué de fréquence ou d'intensité, certains malades ont presenté des symptômes certains de tuberculose pulmonaire, constatés non seulement par l'auscultation, mais principalement par la présence des bacilles de Koch dans l'expectoration. Ces malades là se comportent vis-à-vis de la tuberculose d'une façon très spéciale. En effet la tuberculose parait n'avoir aucune influence sur l'asthme ni le diminuer, ni, au contraire, l'aggraver. Ce qui produisait les crises de l'asthme avant l'infection les produira également pendant la tuberculose ou après la guérison. Nous les avons vu ces asthmatiques ne jamais avoir de crise dans la montagne, mais par contre dès qu'ils rentraient dans leur milieu d'avoir des crises comme par le passé. Ce n'est pas la tuberculose qui est la provocateur de la crise, mais simplement des poussières, des odeurs, des excés, etc., ou tout autre agent. Ce qui a fait découvrir la tuberculose chez ces malades, ou ce qui a engagé les médecins à chercher dans cette direction, ce sont soit une hémoptysie, soit une pleurésie, ou simplement une bronchite plus tenace, mais ce n'est jamais une aggravation, soit en intensité, soit en fréquence des crises d'asthme.

D'un autre coté la tuberculose ne parait pas être influencée défavorablement par les crises d'asthme. En effet, si l'on ausculte un de ces tuberculeux pendant une crise, on est étonné du nombre de râles sibilants que l'on entend sur toute la hauteur des poumons. On s'attendrait à un réveil des foyers, à une poussée fébrile, à une hémoptysie, en un mot, à ce que la maladie se soit rapidement étendue. Il n'en est rien et la crise finie depuis plusieurs jours on est frappé de trouver les foyers tuberculeux absolument dans le même état qu'avant. S'il nous est permis, avec ce petit nombre de cas, de parler de prognose, nous la déclarerons plutôt favorable car, la guérison

de la tuberculose est le plus fréquent. Dans les autres cas, sa marche nous parait très notablement ralentie.

Conclusions.—1. Les asthmes essentiels de l'enfance paraissent présenter une certaine immunité contre la tuberculose pulmonaire.

2. Que s'ils deviennent tuberculeux la tuberculose évoluera d'une manière absolument indépendante de l'asthme.

3. Que l'asthme n'est nullement dépendant de la tuberculose et ne disparaitra pas avec la guérison de celle-ci.

4. Que la prognose parait plutôt favorable.

Observation 1. M. B., étudiant en droit 19 ans. A. H.—O. Dès l'âge de 4 ans souffre de crises d'asthme. A 16 ans opération dans le nez, qui amène une diminution dans la fréquence et dans la violence des crises, qui persistent cependant. A 18 ans lésion pulmonaire. Il va à Davos, pas d'asthme. Il se remet entièrement, mais les crises d'asthme reprennent dans la plaine quoique rares et faibles. A 19 ans rechute. Monte à Leysin dans le deuxième degré (Turban) Bacilles Gy. 8. Reste 4 mois, part avec la désignation "Guérison apparente." Plus de bacilles—a gagné 5 Kgs.—Pas d'asthme à l'altitude.

Observation 2. M. R. 3 ans. A. H.—Parents âgés de 70 ans, bonne santé. Père doit avoir craché du sang. Un frère asthmatique, 50 ans. Jamais de tuberculeux. A. P.—Dès l'enfance crises d'asthme très violentes. A eu une hémoptysie sans recrudescence de l'asthme. Continue à travailler. A 23 ans, 6 mois d'asthme à cause de changement de domicile. A 25 ans a une nouvelle hémoptysie, Bacilles Gy. 4. Va à Davos. Trois mois après guérison apparente, plus de bacille, pas d'asthme à l'altitude. Redescend à la plaine, où il a des crises d'asthme de temps en temps suivant les localités. A 32 ans l'auscultation démontre une cicatrice au sommet gauche. Une compagnie d'assurance assure le malade qui, à coté de ses crises, se porte bien.

Observation 3. Mme. d'U. 33 ans. France. A. H.—O. A. P.—Asthme dès son enfance. Tombe malade à 30 ans; va 21 jours à la Bourboule avec mauvais résultats. Puis vient à Leysin. Y reste 7 mois très améliorée. Quitte la France pour l'Algérie, y reste 2 ans avec crises d'asthme de temps en temps. Revient à Leysin. État troisième degré. Bacilles Gy. 6. Reste 6 mois, repart aggravée. Albumine 1.25%. A eu ces derniers temps de violentes crises d'asthme.

Observation 4. Mlle. K. 13 ans, Russie. A. H.—Suspects. A. P.—Asthme dès lâge de 5 ans. A 7 ans opération des végétations adénoïdes, qui ne diminue nullement les crises d'asthme. Va à Mairon, où elle souffre de nouveau d'asthme. Va bien entre l'intervalle des accés. Etat premier degré. Bacilles Gy. I. Reste un mois, départ. Status idem. Jamais asthme à l'altitude.

III.

Asthme Symptôme de Tuberculose.

G. Sée, et plus tard Pujade parlent pour la première fois d'un pseudo asthme pour désigner la dyspnée intermittente qui quelquefois accompagne

les lésions tuberculeuses, ou qui dans certains cas peuvent en être la première ou la seule manifestation. Reboule, lui, dans ses conclusions écrit, que la tuberculose peut ne se manifester à son début que par des accés d'asthme qu'il appelle asthme prétuberculeux. D'après nos observations et d'après l'étude que nous avons faite des crises d'asthme éclatant soit dans l'âge mûr soit dans la vieillesse, nous pouvons aisément prétendre que certains tuberculoses présentent soit à leur début soit dans le cours de la maladie des crises d'asthme vraies absolument identiques à l'asthme essentiel. Comme cet asthme est comme nous l'avons toujours remarqué de par sa forme clinique entièrement identique à l'asthme symptomatique ou essentiel, et que d'un autre côté il fait partie intime avec la tuberculose pulmonaire dont il n'est qu'un symptôme, je trouve, non seulement inutile, mais faux de l'appeler pseudo asthme ou asthme prétuberculeux. En effet il est aussi intimement lié à la tuberculose, que la fièvre, l'hémoptysie ou l'amaigrissement. Aussi, puisque'il ne vient à l'idée de personne de parler de fièvre ou d'hémoptysie prétuberculeuses, il est faux de parler d'asthme prétuberculeux puisqu'il n'apparait non seulement uniquement au début de la maladie, mais quelquefois dans son cours même. Je voudrais donc voir banir ces expressions de pseudo-asthme ou asthme prétuberculeux, car elles lui enlèvent sa vraie signification en ayant la tendance à lui accorder dans la tuberculose pulmonaire une importance qu'il n'a pas en réalité. Aussi je me contente de l'appeler asthme tout court, en lui accordant la même valeur que tel ou tel autre symptôme. Aussi d'après nos observations nous pouvons déclarer que tout malade présentant subitement dans l'âge mûr ou dans la vieillesse des crises d'asthme non symptomatiques, doit être consideré comme tuberculeux, et dans la presque totalité des cas une recherche attentive et fréquente de l'expectoration, soit directement, soit par la digestion, soit par injections aux cobayes, descellera la présence du bacille de Koch.

A qui attribuer cet asthme? Malheureusement nos connaissances actuelles ne nous permettent que d'échaffauder des théories, compressions, intoxications, etc., mais toutes ne sont que des théories auxquelles il nous est impossible d'accorder plus de valeur qu'à celles qui veulent expliquer la fièvre des tuberculeux. Aussi nous bornerons nous à noter le fait sans vouloir l'expliquer.

L'asthme comme premier symptôme de la tuberculose pulmonaire est beaucoup plus fréquent qu'on pourrait le croire. Ainsi nous l'avons rencontré 18 fois sur les 3018 cas examinés. L'âge auquel il est apparu a varié entre 11 ans et 52 ans. La durée entre le moment où il a éclaté et le moment où la tuberculose pulmonaire a été diagnostiquée sûrement par la présence du bacille de Koch, dans l'expectoration a été variable. Quelquefois l'asthme a été suivi immédiatement de symptômes tuberculeux, accompagnés d'une expectoration bacillaire, dans d'autres au contraire, la durée a été

de une ou plusieurs années jusqu'à ce que l'auscultation et l'examen bacillaire nous aient permis de diagnostiquer sûrement une lésion pulmonaire tuberculeuse, mais aucun de nos examinés se sont restés indemnes de tuberculose. Cette variation de durée ne provient pas uniquement d'une différence de marche de la tuberculose, mais principalement du fait que les médecins ignorent que l'asthme peut être un premier symptôme de tuberculose, et qu'ils n'examinent pas les malades dans ce sens, ils ne voient dans l'asthme qu'une maladie qu'ils s'efforcent de combattre par les moyens habituels. Iodure, repos, changement d'air, etc., et c'est seulement l'arrivé d'un nouveau symptôme, fièvre, hémoptysie, amaigrissement qui [descellera la vraie nature du mal et la vraie cause de l'asthme.

Au point de vue de l'intensité des accés et de leur fréquence, elle est très variée et nullement caractéristique pour la tuberculose. Certains cas très faibles se présentent sous la forme de simple dyspnée se produisant par accés, d'autres au contraire, ont des crises très violentes qui chassent le malade hors du lit et cela durant plusieurs jours de suite. La marche de cet asthme diffère entièrement de celle que nous avons étudiée dans le chapitre précédent. En effet, tandis que les asthmatiques de l'enfance reste absolument indépendant de la tuberculose, au ceux que nous étudions actuellement sa marche dépendra de celle de la tuberculose pulmonaire. Il dimunuera avec celle-ci, il disparaitra avec sa guérison, pour réapparaître à sa première rechute. L'asthme peut, dans quelques rares cas, également apparaître au cours de la maladie ainsi que nous avons pu le constater chez trois de nos malades. C'est un symptôme nouveau venant ajouter aux autres, et qui n'a d'après notre expérience aucune signification favorable ou défavorable. De même que l'asthme non tuberculeux les crises se laissent facilement influencer momentairément par les narcotiques, codéïne, morphine, etc., de même que par un changement d'air, cure altitude, etc., mais ne disparaitrant définitivement qu'avec la guérison totale ou partielle de la tuberculose.

Quant à la marche de la tuberculose chez les asthmatiques, il est à remarquer qu'elle parait plutôt ralentie et très peu influencée durant les crises elles-mêmes, dans ce sens que si la crise est de courte durée et n'affecte pas l'état général, la lésion pulmonaire ne parait pas en être arrivée. Nous n'avons pas non plus jamais constaté d'hémoptysie durant une crise, malgré des efforts de réspiration, ou les accés de toux; par contre il était parfois possible de constater une légère augmentation de température attribuable probablement à la bronchite qui accompagne toujours plus ou moins la crise d'asthme. Quant à la prognose de ces tuberculeux asthmatiques elle ne parait plutôt défavorable; en effet sur les 18 cas observés, 4 sont morts (1 de néphrite, 1 de alcoolisme, 2 d'hémoptysies), 1 est sorti aggravé, 3 stationnaires (étant restés moins de 15 jours) 7 améliorés et 3 guéris.

Conclusion.—1. Certaines tuberculoses pulmonaires présentent, le plus

souvent à leur début, des crises d'asthme identiques à l'asthme symptomatique ou essentiel.

2. Que toutes personnes présentant des crises d'asthme éclatant dans la jeunesse, dans l'âge mûr ou dans la vieillesse est tuberculeux.

3. Que la marche de l'asthme dépend de celle de la tuberculose pulmonaire.

4. Que la prognose est plutôt légèrement défavorable.

Je ne compte pas publier les 18 observations que nous avons recueillis car, elles se ressemblent trop, aussi je me bornerais à publier les plus caractéristiques.

Observation 1. Mme. V. Entrée 4, IV, 00. Sculpteur, 58 ans. A. H.—O. Tousse depuis 1892 avec crises d'asthme. Automne 1899, perte d'appétit, amaigrissement. A Noël 1899, bronchite congestion pulmonaire. Bacilles Gy. 3. Ne salite pas puisque toujours fébrile. Arrive cachectisé, alcoolique, maigrit. État troisième degré. Bacilles. Meurt 1 mois plus tard d'affaiblissement graduel et paralysie du coeur.

Observation 2. Entrée 20, IX, 98. M. P. Étud. med. Allemand, 25 ans. A. H.—Grand'mère morte de tuberculose. Parents sains. Un frère a été malade et est guéri. A 15 ans, catarrhe suspect au sommet avec crise d'asthme qui guérissent après un séjour de 5 mois à Davos. Dès lors très bien portant; fait son service militaire et ses études de médecine sans incident. Il y a trois mois bronchite avec expectoration muqueuse, et reprise des crises d'asthme. Un accés hier en route d'Aigle pour avoir marché très vite pour rattrapper la poste. État premier degré. Bacilles Gy. 1. Reste 1 mois ici, pas de crises d'asthme plus de bacilles.

Observation 3. Entrée 11, X, 02. M. R. 21 ans. Commerçant français. A. H.—Un frère a été à Leysin il y a 9 ans. Guéri. A. P.—Asthme à l'age de 13 ans très amélioré après une saison à la Bourboule il y a trois ans. A toussé cet été, et en Juillet légère hémoptysie. Ne tousse qu'avec les crises d'asthme, qui sont assez fréquentes, sans causes occasionnelles apparentes. Etat premier degré. Bacilles Gy. V. Reste 1 an ½ à Leysin en retournant de temps en temps à la maison. A eu souvent des crises d'asthme soit à la plaine soit dans l'altitude. Repart à peu près dans le même état ayant toujours des bacilles, et présentant également à l'auscultation des symptômes de lésions tuberculeux de premier degré. Les crises, quoique moins fréquentes, persistent toujours.

Observation 4. Entrée 18, XII, 07. M. T. 26 ans. Étud. Russe. A. H.—Pas de tuberculeux dans la famille. A. P.—Bien portant jusqu'à l'âge de 20 ans. Subitement en 1901 bronchite et asthme violent qui dure 4 mois. La bronchite guérit mais l'asthme persiste pendant 2 ans. Rechute d'asthme violent en 1907. Va au sanatorium de Schömberg, où les médecins constatent des accés d'asthme typique avec infiltrations des deux sommets et expectorations riche en bacilles. Il reste 7 mois à Schömberg où le malade se remonte rapidement, il gagne 6 Kgs., ne crache et n'expectore presque plus, et les crachats ne contiennent plus de bacilles. Les derniers temps plus de crises d'asthme, commençant de décembre 1907, nouvelle rechute avec crises d'asthme typiques. Bacilles Gy. 6. S'améliore rapidement, mais part après 2 mois. Depuis 15 jours plus de crises d'asthme.

Observation 5. Entrée VII, 1904. M. Van M. Dr. en Médecine. Hollande, 28 ans. A. H.—O. A. P.—Antérites à répétitions polypes. Larynx opéré il y a 6 ans. Été 1900 bronchite avec bacilles de Koch. Vient à Leysin, passer 5 mois. État premier degré. Bacilles Gy. 3. Quelquefois de la fièvre. Repart très amélioré, a gagné 5 Kgs. Rechute en 1902. Revient à Leysin, Mars 1903, poussée de pleurésie. Bacilles Gy. 7. Part le 4 Sept. 1903 avec guérison apparente, revient à Leysin en Juillet 1904. C'est fatigué l'an dernier pendant voyage, et a eu en rentrant plusieurs reprises des crises d'asthme qui se répétent durant toute l'année. Expectoration muqueuse abondante, contenant des bacilles. Sept. 1904 départ. Amélioré, crache encore, beaucoup, crises d'asthme moins violentes et plus rares.

IV.

Asthme dans la Tuberculose Miliaire Aiguë.

Si je n'ai pas fait rentrer dans le chapitre précédent cette forme d'asthme c'est qu'il nous a été impossible d'observer un seul cas de tuberculose miliaire aiguë présentant des symptômes d'asthme aiguë typique. Les cas de tuberculose miliaire aiguë que nous avons été à même d'observer, présentaient dans les derniers jours de leur existence les symptômes d'une violent dyspnée avec de légère et très irrégulières exacerbations. Ces dyspnées nous faisaient l'impression de résulter uniquement d'une diminution considérable de la surface réspiratoire, et non d'une névrose due soit à l'intoxication, soit à la compression. Aussi ces dyspnées ne se laissaient elles influencer par aucun narcotique pas même par les injections sous cutanées de doses assez fortes de morphine. Aussi serions nous plutôt tentés de l'appeler avec Graves, asphyxie tuberculeuse aiguë. Cependant nous ne voulons pas nier la possibilité de véritables crises d'asthme dans la tuberculose miliaire aiguë, car les auteurs qui l'ont décrité sont si nombreux—Cruveilhier, Andral, Jaccoud, Baillard, Mairet, G. Sée, Pujade, Dieulafoy, etc., que nous n'osons pas en nier la possibilité. Toutefois nous tenons à noter que malgré notre immense matériel nous n'avons jamais pu l'observer. Aussi nous permettons de croire à sa rareté.

1. Cruveilhier: Traité d'Anatomie pathologique
2. Andral: Clinique médicale, tom. iv.
3. Bayart: Thèse de Paris, 1877.
4. Mairet: Thèse d'agrégation, 1878.
5. Pujade: De la Tuberculose pseudo-asthmatique, Paris, 1879.
6. Brugelman: Asthma und Tuberkulose, Therapeutische Monatshefte, 1898; Das Asthma, sein Wesen und seine Behandlung, Wiesbaden, 1907; (2) Dasselbe, Wiesbaden, 1905; (3) Idem.
7. Sarda et Virés: Mémoires publiées, Revue de la Tuberculose, 15 Juillet, 1894.
8. Grasset: Leçons cliniques, 1896.
9. Rancoule: Thèse de Montpellier, 1899.
10. Baur: Forme clinique de la tuberculose pulmonaire.
11. Landouzy: Les Sérothérapies.
12. Reboule: De l'asthme prétuberculeux, thèse de Montpellier, 1904.
13. A. L. James: Lectures on Medicine, Winter Session, 1902–1903.
14. William Osler: The Principles and Practice of Medicine, June 26, 1906.
15. F. Socca: Archives générales de médecine, 26 Juin, 1906.

DIE BLUTUNTERSUCHUNGEN NACH ARNETH'SCHER METHODE BEI TUBERKULÖSEN VOM KLINISCHEN STANDPUNKTE AUS.

(AUS DEM SANATORIUM DER HEILANSTALT FÜR LUNGENKRANKE IN ZAKOPANE, GALIZIEN.)

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Die vorliegende Arbeit ist eine Fortsetzung von Untersuchungen, welche wir voriges Jahr angefangen und mit welchen wir uns einige Monate lang beschäftigt hatten. Die Ergebnisse wurden in der polnischen Fachliteratur zu Anfang des laufenden Jahres veröffentlicht.

Die Untersuchungen, welche wir hier vorlegen, machen, samt der zuletzt veröffentlichten, eine Einheit aus, deswegen, weil Schlüsse, zu denen wir nunmehr angelangt sind, die vorherigen bestätigen und vervollständigen. Wir erlauben uns, unsere Arbeit dem internationalen Tuberkulose-Kongress vorzulegen, in der Meinung, dass alle Untersuchungen, welche biologische Fragen im Zusammenhange mit noch wenig erörterten klinischen Problemen, betreffs der Tuberkulose zu beantworten suchen, nicht ohne Interesse in mit diesen Fragen sich beschäftigenden Kreisen bleiben sollten.

In der Reihe der mit der Behandlung der Lungentuberkulose im Zusammenhange stehenden Fragen scheint uns eine der wichtigsten, sowohl vom sozialen wie auch vom Standpunkte der Interessen des Kranken, die Frühdiagnose zu sein. Die Sache ist selbst an und für sich klar und bleibt heute ausser Diskussion.

Man hat ihr in letzterer Zeit einen bedeutenden Platz in der Fachliteratur gewidmet, aus dem Grunde, dass die Frühdiagnose uns die Möglichkeit die Frühbehandlung zu leiten und *eo ipso* bessere Erfolge zu erhalten giebt. In Deutschland besonders, wo der Kampf gegen die Tuberkulose auf so ein umfangreiches Gebiet sich erstreckt, wo sowohl der Staat als auch die ganze soziale Organisation für die Ziele dieses Kampfes an finanziellen Mitteln nicht sparen, wurde die Frage der Frühdiagnose sowohl in der Klinik wie in der speziellen Literatur auf den ersten Plan herausgehoben. Wir sind, wie bekannt, im Besitze von drei Methoden für die Diagnose der Lungentuberkulose: physikalische Untersuchung, Tuberkulinprobe und

Serumdiagnose.* Die physikalische Untersuchung, wie uns die Klinik lehrt, ist häufig unzureichend, besonders wenn es sich um latente aktive Herde handelt, denen man, von inaktiven abgesehen, nach Nägeli sehr oft begegnet. Die Tuberkulinprobe leistet uns oft unsichere und zweifelhafte Resultate. In der menschlichen, im Gegensatze zu der Perlsuchttuberkulose, kann sie nicht als entscheidend betrachtet werden, umso mehr, da das Tuberkulin Reaktion nicht nur in der Tuberkulose, sondern auch in verschiedenen anderen Krankheiten (Luës, Lepra, Carcinoma, Chlorose, etc., etc.) sowie bei den Rekonvaleszenten nach verschiedenen Krankheiten und auch bei ganz Gesunden giebt. Was die Serumdiagnose anbetrifft, wird dieselbe unseres Wissens für die klinischen Ziele nur in Frankreich angewendet; sie war wegen ihrer ganz negativen Resultate Gegenstand einer scharfen Kritik seitens bekannter Bakteriologen und Kliniker.

In Deutschland z. B. wurde sie in Folge ihrer klinischen Unzulässigkeit in der Frühdiagnose der Lungentuberkulose fast ganz weggeworfen. Es wäre natürlich sehr erwünscht, eine neue Methode zu finden, die in Verbindung mit den heute üblichen durch Ergänzung ihrer Mängel sicherere Resultate zu ergeben fähig wäre.

Eine solche Methode könnte auch aus dem Grunde grosse Dienste leisten, dass neben der Frühdiagnose auch die Orientierung im Verlaufe des krankhaften Prozesses sich als eine nicht wenig wichtige Frage darstellt. Schon vor einigen Jahrzehnten machte Brehmer darauf aufmerksam, dass die Tuberkulose einen "vollständig unberechenbaren und atypischen Verlauf" hat.

Infolgedessen wird die Prognose—wenn wir die Fälle mit ganz klarem klinischen Bilde bei Seite stellen—ganz schwer und unbestimmt. Denn man kann dieselbe nicht auf eine feste Grundlage stellen, die uns zu sicheren und bestimmten Schlüssen ermächtigt.

Einem solchen Bedarfe scheint in einem gewissen Grade die von Arneth entdeckte Blutuntersuchungsmethode zu entsprechen, die er in einer ganzen Reihe Infektionskrankheiten, unter anderen auch in der Tuberkulose angewendet hatte. In der polnischen Fachliteratur war diese Methode Gegenstand einer kurzen Notiz von Tomaszewski, und einer sehr ernsten Arbeit von Zelewski, der mittelst Arneth'scher Methode eine bedeutende Anzahl recht interessanter Untersuchungen speziell beim Kindesalter gemacht hat.

Wir wollen in kurzen Worten die Grundrisse der Arneth'schen Methode mit Berücksichtigung ihrer bedeutendsten Seite erwähnen. Seine Untersuchungen betreffen, wie bekannt, nur eine Art der weissen Blutkörperchen, nämlich der Neutrophilen, denen Arneth in der Vertheidigung des Organismus gegen die Infektion und Intoxikation eine grosse Bedeutung zuschreibt.

* Von Ophthalmo- und Kutanreaktion wollen wir hier absehen; dieses Problem ist noch nicht definitiv entschieden.

Auf Grund der Metschnikoff'schen Theorie behauptet Arneth, dass beim Zerfallen dieser Blutkörperchen sich Schutzstoffe bilden, die eine aktive Rolle im Kampfe des Organismus mit den krankhaften Prozessen spielen.

Die Originalität der Arneth'schen Idee beruht eigentlich auf der Klassifikation der "Neutrophilen" je nach der Quantität der Körner nach ihrer grösseren oder kleineren Differenziation.

Das normale Bild der neutrophilen Blutkörperchen stellt sich in runden Ziffern in folgender Weise dar. (Siehe Taf. I.)

I.			II.			III.				IV.					V. und mehr.							
M.	W.	T.	2K.	2S.	1K 1S.	2K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	5K.	5S.	4K. 1S.	3K. 2S.	2K. 3S.	1K. 4S.	und	S. W.
..	..	5	..	23	12	2	6	17	16	4	..	6	2	5	1	..	1		..	..	..	..
5%			35%			41%				17%					2%							

Anmerkung: Wir erinnern, dass der Buchstabe M. in der I. Klasse Myelocyten bezeichnet. W—Blutkörperchen mit wenig eingebuchteten Körnern. Die Blutzellen der folgenden Klassen bezeichnen alle Kombinationen der Körner, die rund (K) oder schlingenförmig (S) sind. Also z. B. 2 K und 1 S in der III. Klasse bezeichnet einen Leukocyt mit zwei runden Körnern und einer Schlinge u. s. w.

Wie aus diesem Bilde ersichtlich ist, befinden sich die "Neutrophilen" im Blute eines gesunden und normalen Menschen in gewissen bestimmten Verhältnissen, indem die vorwiegende Zahl den Klassen II, III, und IV (93%) angehört.* Dieses Verhältnis wiederholt sich beständig und beinahe in derselben Weise bei allen 15 von Arneth untersuchten und ganz gesunden erwachsenen Menschen. Infolgedessen wird dieses Muster, das das durchschnittliche Resultat darstellt, durch den Autor als das normale Bild des gesunden und erwachsenen Menschen betrachtet. Diese Prozent-Verhältnisse unterliegen jedoch auch bei ganz normalen Bedingungen gewissen Schwankungen. Aus den Arneth'schen Untersuchungen folgt es, dass die Verschiebung des Bildes nach links auch um 15% (also 55% anstatt 40% in I. und II. Klasse) noch nicht als eine anormale Erscheinung in Folge des infektiösen Prozesses betrachtet werden kann.† Dagegen eine stärkere Verschiebung in derselben Richtung soll als Symptom des krankhaften Prozesses angenommen werden, dessen Intensität im gleichen Verhältnisse zur

* Einem ganz anderen Blutbilde begegner man, nach Untersuchungen von Zelenski bei Kindern, bei denen die vorwiegende Zahl der Neutrophilen sich in den ersten Klassen befindet und dabei die Myelocythen gar nicht so selten vorkommen.

† Arneth: Die neutrophilen weissen Blutkörperchen. Seite 18, Fall S. R. und Ein.

Vergrösserung der weissen Blutkörperchen in zwei ersten Klassen bleiben wird.

Je grösser Infektion oder Intoxikation werden, desto mehr wird die Verschiebung des normalen Blutbildes bedeutender werden. Die Beobachtung der sich stets wiederholenden Veränderungen im Blutbilde und namentlich die Vergrösserung der Blutkörperchen in zwei ersten, mit korrespondierender Verminderung in folgenden Klassen gab dem Autor den Anlass zum Schluss, dass der Zerfall der weissen Blutkörperchen für die Bildung der Schutzstoffe in gewisser bestimmter Ordnung folgt, nämlich: Im Kampfe mit der Infektion oder Intoxikation gehen erstens die Blutkörperchen der höheren Klassen zu Grunde.

Dieses Phänomen wird durch Arneth in der Weise erklärt, dass diese Leukocyten die höchste Quantität der Schutzträger besitzen und in Folge dessen von dem Organismus auf den ersten Plan des Kampfes gestellt werden. Je nach ihrem Verschwinden von dem Kampffelde werden sie durch neue Generationen ersetzt, dank der reizenden Wirkung der blutbildenden Organe, welche bekanntlich die einfachsten, auf der niedrigsten Stufe des Arneth'schen Bildes befindlichen Körperchen produzieren. Nach dem bildlichen Vergleiche von Zelenski könnte man diese Angelegenheit mit dem Ausheben von Rekruten während der Kriegszeit vergleichen; je mehr von Soldaten getötet werden, desto mehr der Jugend muss der Staat auf den Kriegsplatz schicken, um mittels derselben die niedergemetzelten Bataillone zu ersetzen und sogar muss der Staat in grosser Not auch selbst zum Knabenalter greifen, dem in unserem Bilde die Gruppen M. und W. entsprechen. Wenn die Leukocytenarmee liegt, kehren wieder die normalen Verhältnisse zurück.

Es ist notwendig, hier zu bemerken, dass die Veränderungen des Blutbildes in verschiedenen krankhaften Prozessen beim Menschen durch Arneth in dessen Untersuchungen bei Tieren kontrolliert wurden. Er injizierte Eiweisskörper, Toxine und lebende Bakterien den Kaninchen ein und beobachtete bei dem Befunde der eosinophilen Blutzellen Veränderungen, die analog denen waren, die bei Infektion oder Intoxikation im neutrophilen Blutbilde des Menschen stattfanden. Die Eosinophilen des Kaninchens entsprechen, wie bekannt, den Neutrophilen beim Menschen.

Ehe wir von den speziellen Untersuchungen von Arneth* auf dem Gebiete der Lungentuberkulose sprechen werden, wollen wir erst kurz seine Untersuchungen, die andere infektiöse Krankheiten betreffen, erwähnen. Hie und da haben die Ursachen des krankhaften Prozesses eine analoge

* Arneth zeigt uns eine ganze Reihe Infektionskrankheiten, wie Typhus abdominalis, Pneumonia fibrinosa, Scharlach, Rheumatismus etc., bei denen er mehr oder weniger starke Veränderungen des neutrophilen Blutbildes gefunden hatte. Jedoch können wir sie nicht weiter berücksichtigen, da es den Rahmen unserer Arbeit überschreitet. Wir gehen direkt zu den Untersuchungen über die Lungentuberkulose.

Quelle. Hie und da wird als pathologischer Faktor der Mikrobe, der mannigfaltige Wirkungen auf Gewebe und Säfte des Organismus ausübt, sein. Entweder überwiegt die unmittelbare Infektion des Organismus durch die Mikrobe, oder die Intoxikation wird durch die von ihnen gebildeten Toxine erzeugt, oder es zeigt sich Sepsis in Folge der Einwanderung der Mikroben in die allgemeine Blutbahn, oder endlich haben wir mit diesen verschiedenen Kombinationen zu tun. Je nach der Intensität der Intoxikation des Organismus werden im neutrophilen Blutbilde grössere oder kleinere Veränderungen stattfinden. Eine besondere Ausnahme in dieser Richtung nimmt der Tetanus ein, aber dies ist eine spezielle Frage, die einer besonderen Besprechung bedarf.

Hier erleidet das neutrophile Blutbild öfters als in anderen Krankheiten und manchmal trotz der günstigen klinischen Symptome bedeutende negative Veränderungen. Auf diese Eigenschaft der Tuberkulose legt Arneth ein starkes Gewicht, indem er sie als eine eminent infektiöse Krankheit bezeichnet. Auf Grund seiner hämatologischen Untersuchungen zerteilt er dieselben in zwei grosse Abteilungen: auf der einen Seite haben wir allgemeine Miliartuberkulose und auf der anderen verschiedene andere Formen und zwar: akute und subakute, mit hohem Fieber, chronische, fieberfreie, mit gutem allgemeinem Zustande, oder chronische, mit sich langsam bildenden grossen Kavernen bei sehr schlechtem Allgemeinbefinden.

Was die Miliartuberkulose anbetrifft, nimmt sie einen besonderen Platz deswegen ein, weil sie stets eine eminente Verschlimmerung des Blutbildes mit der gleichzeitigen Verminderung der allgemeinen Leukocytenzahl darstellt. Diese Erscheinung findet ihre Erklärung in der Ursache, dass der Organismus nicht nur auf einem Punkte, sondern auf der ganzen Linie angegriffen ist, und zum Selbstschutz gezwungen, auf den Kampfplatz die Quantität seiner besten Kräfte wirft, d. h. die am meisten differenzierten polynuklären Leukocyten, die nach der Arneth'schen Behauptung bei ihrem Zerfall die grösste Quantität der Schutzstoffe produzieren. Es folgt also, dass diese Blutkörperchen behufs der Verteidigung des Organismus gegen die massenhafte Einwanderung der Tuberkelbazillen in die Blutbahn auch massenhaft, also in viel umfangreicheren Grenzen als in anderen Formen der Infektion zu Grunde gehen müssen. Ihren Platz nehmen andere, jüngere Generationen ein, die durch beständige und in diesem Falle vermehrte Aktivität der hämatopoietischen Organe gebildet werden. Als Endresultat zeigt sich in der disseminierten Miliartuberkulose eine vollständige Verschiebung des neutrophilen Bildes nach links.

Als Beispiel können wir eine Tafel von den Arneth'schen Untersuchungen vorstellen.*

* Arneth: Die Neutrophilen etc. Seite 147, Fall Nr. 66 Georg.

I.			II.			III.				IV.					V. u. M.	
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	5K.	5S.
1	..	39	2	25	29	1	..	2	1	..	..	..	..	..	..	..
40%			56%			4%				0					0	

Für die Ergänzung des Bildes darf man hinzufügen, dass die allgemeine Leukocytenzahl in diesem Falle 2500, also viel kleiner als die normale ist. Die Miliartuberkulose wird, wie früher bemerkt, immer von der Hypoleukocytose begleitet und das giebt uns auch Gelegenheit zu bemerken, dass Arneth sein neutrophiles Schema nicht als etwas ohne Zusammenhang mit der allgemeinen Leukocyten-Quantität Bleibendes darstellt. Im Begenteil legt er das grösste Gewicht darauf, dass zwischen diesem und jenem ein inniges aus denselben Gründen hervorgehendes Verhältnis besteht. In der Miliartuberkulose z. B. kommt die Vernichtung der weissen Blutkörperchen durch Koch'sche Bazillen in so weiten Grenzen vor, dass die blutbildenden Organe nicht im Stande sind, diesen Verlust zu decken; darauf folgt die Verminderung der allgemeinen Leukocytenzahl.

In Folge der Zusammenstellung seines neutrophilen Blutbildes mit der Zahl der Leukocyten hatte Arneth eine neue Klassifikation eingeführt, wo das normale Blutbild bei normaler Leukocyten-Quantität Isonormoleukocytose* heisst. Auf Grund solcher Klassifikation können wir Isohypo- oder Iso-hyperleukocytose, andererseits Anisonormocytose, Anisohyper- oder Anisohypoleukocytose unterscheiden.

Die Blutuntersuchungen von Arneth in Infektionskrankheiten im Allgemeinen und speziell in der Tuberkulose gaben uns Anstoss zu denselben Untersuchungen, in unserem Sanatorium nur speziell für klinische Ziele. Es interessierte uns hauptsächlich die Frage, inwiefern die Veränderungen im Blutbilde sich im Zusammenhange mit dem klinischen Krankheitsbilde befinden und auch inwiefern auf Grund dieser Blutmodifikationen sich im Verlaufe der Krankheit die Schlüsse betreffs der Prognose stellen lassen.

Unser Material betraf 56 Personen, darunter 55 Kranke und einen Gesunden als Vergleich. Die allgemeine Zahl der Untersuchungen war 121. Das beigelegte Bild betrifft einen 38jährigen gesunden Diener im Sanatorium.

Die nüchtern angestellte Untersuchung ergiebt eine Verschiebung in zwei erste Klassen (links) und um 7%. (Siehe Taf. T. K.) Das Bild wird sich also von dem normalen nur sehr wenig unterscheiden, da die Schwankungen, wie

* Als normale Quantität der Leukocyten betrachtet. Arneth, 5000–6000 in 1 Kubikmillimeter.

wir früher bemerkten, in den normalen Grenzen nach Arneth 15% erreichen können.

T. K.

I.			II.			III.				IV.					V. u. m.	Bemerkungen.
M.	W.	T.	2K.	2S.	1K. 1S.	3k.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	..	..
..	..	6	..	23	18	4	11	10	14	3	..	3	..	8	..	2f. IX, 1907.
6%			41%			39%				14%					..	6,200 Leukocyten.

Ehe wir unsere Untersuchungen analysieren werden, wollen wir einige Worte dem technischen Verfahren widmen. Um die Genauigkeit wegen der Verdauungsleukocytose zu vermeiden, haben wir beinahe alle unsere Untersuchungen nüchtern vorgenommen. Dabei haben wir eine grosse Aufmerksamkeit auf die allgemeine Leukocytenzahl gelegt. Dieselbe wurde als durchschnittliches Resultat der 6 Berechnungen in der Zeiss'schen Kammer aufgenommen.

Die Färbung der Präparate wurde streng nach den Arneth'schen Anweisungen mit dem Ehrlich'schen Triacid ausgeführt. Obwohl wir den Vorwürfen von Zelenski und von ihm zitierten Autoren gegen Triacid zum Teil Recht geben müssen, weil es keine allzu sehr feine Chromatinfäden, welche unter sich die einzelnen Körner verbinden, zeigt,—glauben wir jedoch, dass eine solche Eigenschaft der von uns gebrauchten Färbungsmethode eher im positiven als im negativen Sinne kommentiert werden kann. Sie lenkt unsere Aufmerksamkeit nur auf die wichtigen und prinzipiellen Dinge, ohne sie auf die wertlosen Details zu richten. Denn wir wollen nicht annehmen, dass man einen Leukocyt der III. Klasse z. B. mit drei klar differenzierten Körnern als zu einer niedrigeren aufgehörigen Klasse aus dem Grunde betrachten könnte, dass diese Körner mit einem sehr feinen, beinahe einem Spinnenfaden unter sich verbunden sind. Ein solcher Faden kann jedenfalls nicht ein integraler Teil des Kornes sein, vielmehr sein Rest, der den gemeinsamen Ursprung der Körner durch Differenzierung des Mutterkornes entstanden zeigt. Dies ist die Linie, auf der die Zerteilung stattfand und welche, ungeachtet der Existenz der Fäden, als vollendet betrachtet werden muss. In Berücksichtigung aller dieser Gründe haben wir das Triacid, obwohl es schwerer bei den Berechnungen und ermüdender für das Auge sich erweist, als mehr geeignet betrachtet und bei allen unseren Präparaten angewendet.

Wir müssen hinzufügen, dass behufs leichterer Orientierung in den so mannigfaltigen Prozent-Verhältnissen von Neutrophilen, die man bei dieser Art von Untersuchungen erhält, sowohl behufs leichterer Schätzung von

Aenderungen, die bei einem und demselben Individuum während mehrfach unternommenen Untersuchungen vorkommen können, wir uns erlaubt haben, in das Arneth'sche Schema* folgende Einteilung einzuführen:

Normaler Blutbestand	40–55% in I. u. II. Klasse (nach Arneth)
Sich zum schlechten Blutbestand neigend	55–70% in I. u. II. Klasse
Schlechter Blutbestand	70–85% " " " " "
Sehr schlechter Blutbestand	mehr als 85% " " " " "

Was unser klinisches Material anbetrifft, konnten wir es uns auf Turban's Klassifikation stützend in drei Gruppen teilen: I. Stadium: 18 Kranke, welche wir in drei folgende Klassen teilen: die erste umfasst 10 Kranke, deren Befund sowohl hinsichtlich der Lungen sowie des Allgemeinzustandes befriedigend war, Temperatur seit einigen Monaten dauernd normal. Die Neutrophilenzahl schwankt in diesen Fällen in den ersten zwei Klassen von 41 bis 54%, demgemäss befreit uns dies vom Vorlegen erhaltener Bilder.

Die zweite Gruppe in diesem Stadium umfasst 6 Kranke, bei denen das Blutbild sich schlechter erwies und zwar nach unserem Schema als sich zum schlechten Blutbestande neigend. Wenngleich bei diesen Kranken die pathologischen Veränderungen in den Lungen nicht allzu gross waren, herrschte dennoch bei allen Neigung zum Status subfebrilis, welcher mehrere Tage lang dauerte, mit nicht allzu sehr befriedigendem Ernährungszustande. Dies bestätigt einige Schlüsse Arneth's, von denen wir bei einer anderen Kategorie von Kranken sprechen werden, nämlich, dass unabhängig vom Allgemeinbefinden und der Verbesserung des Lungenprozesses diese Faktoren, die wir vorhin berührt hatten, vollständig ausreichend sind, um ein unvollkommenes normales Blutbild zu geben und zwar deshalb, weil sie nach unserer Erfahrung tief versteckte Herde verraten können, die den physikalischen Untersuchungsmethoden unzugänglich sind. Solche Herde, welche mit der Zeit die jetzt latente Tuberkulose in eine offene umgestalten können, sind im Stande, über den weiteren ungünstigen Verlauf der Krankheit zu entscheiden.

Die Neutrophilenzahl in den ersten zwei Klassen schwankt bei diesen Kranken von 58 bis 68%. Es bleiben noch zwei Kranke, welche dem I. Stadium angehören und bei denen das Blutbild nicht in Harmonie mit den Lungen und dem Allgemeinzustande war und von denen wir in wenigen Worten sprechen wollen.

1. Junger Mann, S. A., 19 Jahre alt, Schallverkürzung in der rechten Spitze, verschärftes Athmen in beiden Spitzen ohne Rasselgeräusche. Der Allge-

* Ein solches Schema ist gewiss etwas künstlich, wir hatten aber als Kriterium vom Uebergange eines Bestandes zum anderen 15%, wie es Arneth angiebt, als Grenzen, in denen der normale Blutbestand schwanken kann, angenommen. Wenngleich künstlich, giebt jedoch dieses Schema dem Leser die Möglichkeit, sich in der Bedeutung der Zahlresultate unserer Untersuchungen einzuführen und dadurch rechtfertigt er seine Einführung.

meinzustand befriedigend. Blutbestand sich zum schlechten neigend, was im Zusammenhange mit bedeutender Hypoleukocytose (s. Tafel S. A.) sich durch langdauernde Eiterprozesse in den Halsdrüsen erklären lässt.

KRANKER S. A.

I.			II.			III.				IV.					V. U. M.	BEMERKUNGEN.
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	..	
..	..	17	1	18	25	6	2	16	9	2	..	1	..	3	..	16. IV, 1908, 8 Uhr Morgens.
17%			44%			33%				6%					..	10,600 Leukocyten.

Ein viel schlechteres Blutbild finden wir beim zweiten Kranken.

2. Junger Mann, J. R., 21 Jahre alt, Schallverkürzung in beiden Spitzen mit geschwächtem Athmen. In rechter Spitze einige Knackse nach Husten. Leidet an einer farco-eitrigen Darmfistel als Folge einer vor 8 Monaten operierten Appendicitis. Jede Verschärfung des krankhaften Darmbestandes begleitet eine Temperaturerhöhung bis 38 Grad und höher. (Siehe Taf. J. R.)

KRANKER J. R.

I.			II.			III.				IV.					V. U. M.	BEMERKUNGEN.
M.	W	T.	2K.	2S.	1K. 1S.	3K	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	..	..
..	1	24	6	18	29	5	..	9	4	1	..	2	..	1	..	30. IV, 1907.
25%			53%			18%				4%					..	9,400 Leukocyten.

Wir gehen zum Kranken des II. Stadiums über. Es umfasst 17 Kranke, die wir hinsichtlich unserer Untersuchungen in zwei Gruppen teilen: (1) bei 6 Kranken wurden die Blutuntersuchungen nur einmal angestellt. Das Blutbild erwies sich bei ihnen als normal oder sehr wenig von der Norm abweichend, was mit dem Allgemein- und Lungenzustande im Einklange stand, den wir entweder sogleich nach der Ankunft des Kranken ins Sanatorium oder vor der Abfahrt als ein günstiges Resultat von mehrmonatlicher Behandlung in der Anstalt festgestellt hatten. Eine Ausnahme bildet die kranke M. C., 20 Jahre alt, bei der das Blutbild schlecht war, es betrug nämlich in den ersten 2 Klassen 75% bei der Allgemein-Leukocytenzahl, die 12,500 ausmacht. Diese Patientin wurde nach Turban's Klassifikation zum II. Stadium eingereihht, aber der allgemeine Ernährungszustand lässt viel zu wünschen übrig. Sie ist zwar fieberfrei, aber die bakteriologischen Sputumuntersuchungen erwiesen deutliche Zerfallherde, da bei reichlicher

Zahl der Tuberkelbazillen sehr viele elastische Fasern in grossen Bündeln nachgewiesen wurden.

(2) Bei zwei folgenden Kranken wurden die Untersuchungen behufs Prüfung des klinischen Verlaufes mindestens zweimal, in einem Falle sogar 15 Mal angestellt. Ueber dies wollen wir aber noch später sprechen. Bei 4 von dieser Zahl folgte eine Verbesserung des Blutbildes und des Lungenzustandes bei gleichzeitiger enormer Verbesserung des Allgemeinbefindens.

Als Beispiel führen wir nächstfolgenden Fall an: Junger Mann, W. S., (s. Tafel) 24 Jahre alt; linke Lunge vorne: unbedeutende Verschärfung des Athmens in der Spitze. Rechte Lunge vorne: Schallverkürzung im I. Interkostalraum und einige Krepitationen und Subkrepitationen daselbst und im II. Interkostalraum. Rechte Lunge hinten: mässige Dämpfung über dem Schulterblatte und geringe Krepitation daselbst.

Als Komplikation trat ohne sichtbare Ursache Pleuritis exsudativa serosa dextra hinzu, begleitet durch die Symptome einer allgemeinen Intoxikation, schlechter Herzzustand (Pulsfrequenz 120–140). Sehr schlechtes Allgemeinbefinden, Temperatur 39 Grad und höher während 3–4 Wochen und die sich bis zur unteren hinteren Grenze und bis zur Achselhöhle erstreckte.

Die erste Blutuntersuchung, die zur Zeit, da der Kranke sich in einem fast hoffnungslosen Zustande befand, angestellt wurde, erwies Folgendes:

KRANKER W. S.

	I.			II.			III.				IV.					V. u. M.	Bemerkungen.
	M.	W.	T.	2K.	2S.	2K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	5K. u. s. w.	
I	..	1	20	2	32	30	6	2	4	1	..	..	..	..	2	..	12. IV, 1908. Nüchtern 8.30 Morgens.
	21%			64%			13%				2%					..	4,200 Leukocyten.
II	..	..	15	1	32	22	2	5	10	13	..	..	..	..	..	..	8. V, 08. 12½ Vormittag.
	15%			55%			30%				..					..	5,200 Leukocyten.
III	..	..	22	..	28	21	1	5	9	10	..	..	..	2	2	..	18. V, 08. 8½ nüchtern.
	22%			49%			25%				4%					..	7,200 Leukocyten.

Die zweite Untersuchung, vier Wochen später angestellt, erwies schon eine deutliche Verbesserung des Blutbildes, was mit der Verbesserung des

Zustandes der Kranken, die schon 8–10 Tage vor der Blutuntersuchung eintrat, übereinstimmte. Ein viel besseres Selbstgefühl, ein besserer Appetit, Verdauung, Schlaf u. s. w. Pulsfrequenz 80–96. Symptome der Pleuritis um vieles gemildert. Die dritte Untersuchung folgte 10 Tage nach der zweiten und wie aus der beigefügten Tafel ersichtlich ist, zeigt sich noch keine weitere Verbesserung des Blutbildes. Es kann sein, dass die Zeit zwischen den beiden letzten Blutuntersuchungen zu kurz war, um eine Verbesserung des Lungenzustandes und Allgemeinbefindens herbeizuführen. Es ist gleichfalls möglich, dass dieser Fall die Ansicht Arneth's bestätigt, dass jegliche Verbesserungen des Blutbildes viel langsamer und schwerer vorkommen, als man es auf Grund klinischer Symptome erwarten würde. Bei vier weiteren Patienten wurde die Verschlimmerung des Lungenbefundes durch die des Blutbildes begleitet, aber die letztere ging langsamer vor. Als Beispiel können wir bei der 4. beim Kranken St. M. durchgeführten Untersuchung die erste und die letzte zitieren. (Siehe Taf. St. M.)

Dieser Fall ist aus diesem Grunde interessant, weil einem am Anfange unserer Behandlung guten Blutbilde ein verhältnismässig nicht schlechter Lungenzustand entsprach. Im weiteren Verlaufe zeigte sich jedoch, wie es öfters in der Lungentuberkulose vorkommt, eine ohne sichtbare Ursache auftretende Verschlimmerung, die bis zur Abreise des Kranken stets zunahm. In vollem Einklange mit dieser Tatsache befinden sich die in derselben Zeit angestellten Blutuntersuchungen, die uns zeigen, dass die Leukocytenzahl in zwei ersten Klassen bei der ersten Untersuchung 63% und bei der letzten 80% betrug, d. h. sie vermehrte sich um 17%.

KRANKER St. M.

I.			II.			III.				IV.					V U. M.	BEMERKUNGEN.
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.		
..	..	25	..	24	14	..	9	10	13	..	..	1	1	3	..	22. III, 1907.
25%			38%			32%				5%					..	
..	1	20	2	26	31	3	1	9	4	..	..	..	..	3	..	26. VI, 1907.
21%			59%			17%				3%					..	

Dasselbe lässt sich von zwei anderen analogen Fällen sagen, nur mit dem Unterschiede, dass die Verschlimmerung des Blutbildes sich in engeren Grenzen vollzog.

Im Gegensatze zu diesen Fällen, in denen sich die Lungen im Einklange mit dem Blutbilde befanden, wollen wir die 3 letzten, zum II. Stadium

gehörigen Fälle erwähnen, in denen man diesen Einklang nicht feststellen konnte. Alle diese Fälle betreffen die Kranken mit einem stark nach links verschobenen Blutbilde und trotzdem, dass in diesen 4 Fällen sowohl die Verbesserung der Lungen als das Allgemeinbefinden ganz deutlich war, blieb das Blutbild ohne jegliche Besserung, in einem Falle trat sogar Verschlimmerung ein.

Als Beispiel führen wir die Tafeln an. (Kranke A. M. und C. C.)

KRANKE A. M.

I.			II.			III.				IV.					V. u. m.	Bemerkungen.
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K 2S.		
..	..	23	1	29	31	2	3	6	2	..	..	1	..	2	..	18. IV, 1907.
23%			61%			13%				3%					..	5,500 Leukocyten.
..	..	21	2	22	37	1	..	8	5	1	..	..	..	3	..	20. V, 1907.
21%			61%			14%				4%					..	5,800 Leukocyten.

KRANKE C. C.

I.			II.			III.				IV.					V. u. m.	Bemerkungen.
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	..	
..	..	10	4	20	23	3	10	12	11	2	..	..	1	4	..	23. IV, 1907.
10%			47%			36%				7%					..	9,000 Leukocyten.
..	..	16	2	20	34	2	1	10	9	2	..	..	1	3	..	20. VI, 1907.
16%			56%			22%				6%					..	10,100 Leukocyten.

Wie aus der Tafel A. M. ersichtlich, ist der Unterschied zwischen zwei Untersuchungen in zwei ersten Klassen so klein (2%), dass man ihn ausser Acht lassen kann. Auf der Tafel C. C. dagegen ist die Verschiebung nach links (um 15%) schon genug bedeutend, um diese Veränderung des Blutbildes für Verschlimmerung halten zu können. Diese 4 Fälle dürften also nicht die Arneth'sche Theorie bestätigen. Andererseits dagegen ist es nicht ausgeschlossen, dass der weitere Verlauf der Krankheit nach dem Verlassen der Anstalt seitens des Patienten diesen Mangel an Harmonie zwischen Klinik und Blutbild gewissermassen rechtfertigen könnte, in dem Sinne, dass die Besserung während der Anstaltsbehandlung nur vorübergehend

war, wonach Verschlimmerung folgte. Tatsächlich, unter diesen 4 Kranken begann die Patientin A. M. (s. Taf.) trotz einer grossen, in der Anstalt erworbenen Verbesserung, wie uns andererseits bekannt, nach ihrer Heimkehr zu fiebern und ihr Zustand hatte sich nach einigen Monaten stark verschlimmert. Dieser Vorfall könnte eine sehr interessante Arneth'sche Beobachtung bestätigen, nämlich, das dass Blutbild seine guten Dienste nicht nur als ein sehr sensibler, aber auch als ein vorherrschender Faktor in der Orientierung im weiteren klinischen Verlaufe leistet.

Arneth legt ein grosses Gewicht darauf, dass das Blutbild in gewissen Fällen sich nicht im Einklange mit dem günstigen klinischen Zustande befinden kann, und ratet dann, den äusserlich zufriedenstellenden klinischen Symptomen, was die Prognose anbetrifft, nicht zu trauen, sondern sich nach den Resultaten der hämatologischen Untersuchungen zu richten. Für die Bestätigung einer solchen Behauptung zitiert Arneth einige Fälle, in denen nach der Erreichung einer bedeutenden Verbesserung sowohl in der Lungen- als auch der Larynxtuberkulose mit gleichzeitiger bedeutender Erholung des Allgemeinbefindens (Gewichtszunahme fast 7 Kg.) man keine Verbesserung in dem von Beginn der Behandlung an schlechten Blutbilde wahrnehmen könnte. Ein solches Blutbild wurde ungefähr zwei und einen halben Monat später durch starke Verschlimmerung sowohl der Lungen als auch des Allgemeinbefindens bestätigt.

Das III. Stadium umfasst 20 Kranke, von denen wir bei sieben ein einziges Mal das Blut untersucht hatten. In fünf von diesen Fällen konnte das schlechte oder auch sehr schlechte Blutbild mit dem Allgemein- und Lungenzustande als vollkommen übereinstimmend angesehen werden. Als Beispiel führen wir das Blutbild der Kranken M. W., 21 Jahre alt, an, bei der noch Darmtuberkulose erwiesen wurde. (Siehe Taf. M. W.)

KRANKE M. W.

I.			II.			III.				IV.					V. u. M.	Bemerkungen.
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.		
..	2	41	1	24	24	..	..	3	4	..	..	..	..	1	..	2. V, 1907.
43%			49%			7%				1%					..	5,400 Leukocyten.

Bei zweien erwies die Untersuchung ein sich zum schlechten Blutbestand neigendes Blutbild. Es scheint uns dies im kausalen Zusammenhange mit dem Umstande zu sein, dass die Untersuchungen bei diesen Kranken nach 5- bis 6monatlichem Aufenthalte im Sanatorium, d. h. im Augenblicke, in dem die zwei sehr schwer Kranken sowohl im Lungen- als auch im Allgemeinzustande eine enorme Verbesserung erfuhren, unternommen wurden.

Bei 13 restierenden Kranken wurden die Blutuntersuchungen wenigstens zwei Mal angestellt.

Bei 12 Kranken fanden wir den Blutbestand im Einklange mit dem klinischen. Bei dreien von dieser Zahl entsprach die Verbesserung des Blutbildes dem Lungen- und Allgemeinzustande. Als Beispiel führen wir die Tafel der Kranken M. R. an. S. Taf. M. R.

KRANKE M. R.

	I.			II.			III.				IV.					V. u. m.	Bemerkungen.
	M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	1K. 1S.	3S. 1K.	2K. 2S.		
I	..	1	13	3	27	36	2	1	8	4	1	..	2	..	2	..	18. V, 1907. 6,200 Leucocyten.
	14%			66%			15%				5%					..	
II	..	..	9	2	30	27	6	2	16	2	2	..	2	..	2	..	8. IX, 1907 7,700 Leukocyten.
	9%			59%			26%				6%					..	

Wie man sieht, hat sich hier die Leukocytenzahl in zwei ersten Klassen um 12% vermindert. Bei 9 folgenden Kranken begleitete die Verschlimmerung des Lungenprozesses die grössere oder geringere Verschlechterung des Blutbildes. Man sollte hinzufügen, dass die Verschlimmerung in einem Falle von Darmtuberkulose, welche nach dreiwöchentlichem Aufenthalte im Sanatorium in der Zeit zwischen zwei Blutuntersuchungen bei Symptomen einer allgemeinen Intoxikation (Kopfschwindel, Ohnmachtsanfälle, Puls winzig, 130–150, Temperatur 39 bis 40 Grad einige Tage lang dauernd) zurückgetragen wurde. (Siehe Taf. M. N.)

KRANKE M. N.

I.			II.			III.				IV.					V. u. m.	Bemerkungen.
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	5K. u. s. w.	
..	..	17	1	33	22	6	2	10	6	3	..	..	..	..	..	15. IV, 08. 8 morg. nüchtern.
17%			56%			24%				3%					..	4,600 Leukocyten.
..	1	32	..	25	27	..	..	7	6	..	..	..	..	2	..	15,500 morg. nüchtern.
33%			52%			13%				2%					..	7,300 Leukocyten.

Als Illustration dieser Gruppe von 9 oben genannten Kranken können

wir noch charakteristische Blutbilder, die zwei Kranke betreffen, zitieren. (Siehe Taf. J. J. und A. B.)

KRANKE J. J.

I.			II.			III.				IV.					V. u. m.	Bemerkungen.
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.		
..	..	23	5	29	20	3	6	5	5	1	..	2	1	..	..	7. IV, 1907.
23%			54%			19%				4%					..	11,400 Leukocyten.
..	2	25	3	21	40	2	..	4	1	1	..	..	..	..	1	26. V, 1907.
27%			64%			7%				1%					1%	15,700 Leukocyten.

Das Blutbild während der ersten Untersuchung stellte sich sozusagen nicht besonders schlecht, was dem Allgemeinbefinden und den Lungen vollkommen entsprach. Aber die folgende, nach einundeinhalb Monaten angestellte Blutuntersuchung zeigt uns eine bedeutende Trübung der Blutbeschaffenheit im Einklange mit der Verschlimmerung des Allgemeinbefindens und der Lungen. Die allgemeine Leukocytenanzahl ist ganz und gar im Einklange mit dem stark veränderten Blutbilde, denn sie beträgt 15,700.

Wir führen weiter die Untersuchung betreffend den A. B. an, bei dem das Blutbild noch eine viel grössere Verschlimmerung erlitt. (Siehe Taf. A. B.)

KRANKER A. B.

I.			II.			III.				IV.					V. u. m.	Bemerkungen.
M.	W.	T.	2K.	2S	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.		
..	4	13	6	18	22	8	4	14	2	4	..	4	..	1	..	8. IV, 1907. 11,600 Leukocyten.
17%			46%			28%				9%					..	
..	3	25	2	24	36	2	..	6	1	1	..	..	..	..	..	13. VI, 1907. 13,400 Leukocyten.
28%			62%			9%				1%					..	

Indem die Leukocytenzahl sich auf der Taf. J. J. in I. und II. Klasse um 14% vergrössert hatte, reicht hier die Vergrösserung bis 27%.

Es bleiben unter der Zahl dieser 9 Fälle noch 2 zu erwähnen, in denen das Blutbild schon bei erster Untersuchung eine schlimme Form zeigte, bei weiteren aber sich noch entschieden verschlimmert hatte, indem die Ver-

schiebung nach links 10% resp. 7% darstellte. Wir erlauben uns, drei denselben Fall betreffende Untersuchungen anzuführen. (Siehe Taf. A. S.)

KRANKER A. S.

I.			II.			III.				IV.					V. U. M.	Bemerkungen.
M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.		
..	..	21	2	33	12	1	12	7	7	..	..	2	3	..	..	12. III, 1907.
21%			47%			27%				5%					..	10,840 Leukocyten.
..	..	13	2	28	14	5	4	12	13	1	..	3	5	..	..	1. IV, 1907.
13%			44%			34%				9%					..	7,800 Leukocyten.
..	1	22	1	25	32	2	1	6	6	1	..	1	1	..	..	7. V, 1907.
23%			59%			15%				3%					..	8,800 Leukocyten.

Wie aus der Tafel A. S. ersichtlich, ist das Resultat der zweiten Untersuchung besser als das der ersten. Dies lässt sich durch den Umstand erklären, dass diese Untersuchung zur Zeit vorgenommen wurde, da nach der 5-monatlichen Kur im Sanatorium die Patientin eine bedeutende Verbesserung in den Lungen und eine vorzügliche Erholung des Allgemeinbefindens mit Gewichtszunahme von 10 Kilogramm erhalten hatte. Dann aber fing die Kranke allmählig an, sich schlechter zu fühlen und den Appetit ohne sichtbare Ursache zu verlieren. Später zeigte sich eine mässige Diarrhöe (2–3 Stühle täglich). Die Untersuchung der Faeces erwies die Anwesenheit der Tuberkelbazillen und in der Weise wurde die ganze Frage klar. Dieser Fall ist desto spannender, da nach der Verbesserung des Blutbildes bei zweiter Untersuchung, die sich in Harmonie mit günstigem klinischen Verlauf befand, eine rapide Verschlimmerung des Blutbildes im Einklange mit der rapiden Verschlimmerung der Patientin kam. Wir machen darauf aufmerksam, dass die Vermehrung der Neutrophilen in zwei ersten Klassen bei der dritten Untersuchung um 25% höher als bei der zweiten war.

Wir sollten nun den letzten, das III. Stadium betreffenden Fall, bei dem sich die Blutuntersuchung im Widerspruche mit dem klinischen Verlauf befand, ganz besonders besprechen. Dieser Kranke genoss während seiner 6-monatlichen Behandlung in der Anstalt sowohl in Bezug auf das Allgemeinbefinden, wie auch auf den Lungenprozess eine bedeutende Besserung. Die erste, schon nach der Erreichung dieser Besserung angestellte Untersuchung erwies ein relativ sehr verschlimmertes Blutbild. Die näch-

ste, drei und einhalb Wochen danach vorgenommene Untersuchung ergab ein noch mehr nach links vorgeschobenes Blutbild, wie dies aus der Taf. J. B. ersichtlich ist.

KRANKE J. B.

I.			II.			III.				IV.					V. u. m.	Bemerkungen.
M	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.		
..	..	19	4	24	26	1	4	10	8	1	..	1	..	2	..	4. IV, 1907.
19%			54%			23%				4%					..	10,400 Leukocyten.
..	1	18	2	24	38	4	1	6	5	..	..	..	..	1	..	27. IV, 1907.
19%			64%			16%				1 %					..	8,900 Leukocyten.

Augenblicklich ist es uns unmöglich, diesen Widerspruch zu erklären, wir könnten ihn, nach den Arneth'schen Kommentarien in der Weise deuten, dass ein solcher Widerspruch als Ankündigung möglicher, häufiger Verschlimmerung betrachtet werden kann, was wir schon früher mit den Arneth'schen Beispielen bewiesen hatten.

Wir möchten aus dem uns interessierenden Gebiete noch eine Frage hervorheben, nämlich: Die Untersuchungen von Arneth und Uhl bei Tuberkulösen, spezifisch mit verschiedenen Präparaten wie: Alt-Tuberkulin, B. E. (Bazillen-Emulsion), Bouillon Filbré (B. F.) von Denys, von Landerer und anderen behandelten. Bei den Resultaten der Behandlung mit Alt-Tuberkulin kommt Arneth zu sehr interessanten Schlüssen. Im Einklange mit den früher erwähnten Behauptungen kann das Blutbild nicht nur als Kontrolle des Krankheitsverlaufes und Grundlage für die Prognose, sondern auch als Faktor bei der Verifikation bei der Trübung im Zellenleben dienen, die während der negativen Phase als Folge der Hereinführung in den Organismus eines so komplizierten Toxins wie das Tuberkulin erscheinen.

Es ist bekannt, dass der Grad dieser Trübungen, oder mit anderen Worten die Intensität der Reaktion als Temperatursteigerung und eine Reihe objektiver (am ersten Platz in den Lungen und dann in anderen Organen) und subjektiver Symptome (Schmerzen, Mattigkeit, Appetitverlust u. s. w.) zum Vorschein kommt.

Arneth behauptet, dass zwischen dem Grade der Intensität der Reaktion und dem Grade der Schädigung des Blutes, die die erste stets begleitet, ein Parallelismus existiert und in solcher Weise, dass nach der Arneth'schen Definition "durch die Tuberkulininjektion entsprechend der Schwere der Reaktion eine schwere Schädigung des neutrophilen Blutlebens" auftrat.

Er beobachtete nämlich, dass die viel zu grossen Dosen des Tuberkulin, oder mit anderen Worten kleine, aber bei exzessiver Empfindlichkeit des Organismus auf Tuberkulin mehr oder minder schwere Schädigungen des Blutes herbeiführen. Aus dem Blutbilde, welches er am Ende der spezifischen Behandlung erhielt, schliesst Arneth, ob die Behandlung als ganz abgeschlossen betrachtet werden kann, oder ob man sie wiederholen soll, d. h. eine Etappenkur nach Petruschky einleiten. Diese soll in diesen Fällen stattfinden, in denen nach einer Serie von Injektionen das Blutbild keine Besserung erfahren hatte. Eine solche Besserung lässt sich manchmal nach einer längeren, in Etappen verfolgten Behandlung erreichen. Nur nachdem man ein ganz normales Blutbild erhalten hatte, soll man von weiteren Tuberkulineinspritzungen Abstand nehmen und die Kur als abgeschlossen betrachten.

Zahlreiche Untersuchungen des neutrophilen Blutbildes während der spezifischen Behandlung (Alt- und Neutuberkulin B. F. Denys, Hetol, etc.) werden von Uhl in der Heilanstalt Edmundsthal durchgeführt. Seine Resultate stimmen fast mit denen von Arneth überein. In seinen Schlüssen aber geht er noch weiter, indem er die Blutveränderungen für einen noch mehr sensiblen Indikativ bei Tuberkulinreaktionen als die Temperatursteigerung hält. Er zitiert sogar Fälle, in denen die Schädigung des Blutes sich als ein einziges Symptom der Tuberkulinreaktion erwiesen hatte, indem die Temperaturschwankungen so unbedeutend waren (Maximum 37.3 Grad), dass sie fast in normalen Grenzen blieben; die Verschiebung des Bildes nach links dagegen war so scharf, dass die zwei ersten Klassen 95% erreichten. Insofern eine solche Behauptung aus einem grossen, spezifisch behandelten Krankenmaterial bestätigt werden könnte, würden wir im Besitze einer wertvollen Methode sein, hinsichtlich der Orientierung, was den Verlauf und die Wirksamkeit der spezifischen Behandlung anbetrifft.

Wir sollen bemerken, dass in seinen zahlreichen Blutuntersuchungen bei der spezifischen Behandlung Arneth noch zu einem anderen sehr interessanten Schlusse kam, nämlich dass in dem Falle, wenn die Behandlung ohne Reaktion verläuft, die Veränderungen des Blutbefundes ganz unbedeutsam sind. Und tatsächlich, in diesen Arneth'schen Fällen, in denen nach Tuberkulineinspritzungen starke Reaktionen eintraten, unterlag der Blutbefund grossen Veränderungen, und umgekehrt erfuhr das Blutbild unbedeutende Schwankungen bei unbedeutenden Reaktionen. Diese Tatsache wäre in vollem Einklange mit den allgemeinen Anschauungen in Bezug auf die Immunisation des Organismus und auf die Rolle, welche hier die reifen Blutkörperchen spielen.

Wenn man nach der Methode der Koch'schen Schule grosse Tuberkulindosen injiziert und dabei die Reaktion nicht nur zu vermeiden sucht,

sondern sie als erwünschtes Phänomen betrachtet, so wird es als natürlich erscheinen, dass der Organismus, behufs Bildung korrespondierender Quantitätsantitoxine grössere Quantitäten reifer Blutkörperchen benützt, die, wie früher bemerkt, bei ihrem Zerfalle Antitoxin produzieren. Wenn wir dagegen die spezifische Behandlung nach Goetsch-Sahli'scher Methode, d. h. mit den minimalen Tuberkulindosen und bei Vermeidung jeder Reaktion leiten werden, dann wird die aktive Rolle der älteren Blutkörperchen auf ein Minimum reduziert und *eo ipso* das Arneth'sche Blutbild sehr wenig verändert werden.

Wir konnten diese Beobachtungen bei unseren spezifisch behandelten Kranken bestätigen. Unter der allgemeinen Zahl von 55 Kranken hatten wir 11 mit Beranek'schem Tuberkulin streng nach Sahli, mit minimalen Dosen und ohne Temperatursteigerung behandelt. In diesen 11 Fällen können wir eine vollständige Harmonie zwischen unseren Beobachtungen und denen von Arneth in dem Sinne konstatieren, dass das Tuberkulin, ohne Reaktion eingespritzt, gar nicht oder sehr wenig das Blutbild nach links verschiebt. Aber es bleiben noch einige Details, die wir berücksichtigen wollen. Da auch minimale Tuberkulindosen gewisse, obwohl äusserlich unsichtbare Trübungen im Zellenleben hervorrufen müssen, war es interessant, sich zu überzeugen, in welchem Momente nach der Tuberkulineinspritzung diese Trübungen sich durch Blutuntersuchung erforschen lassen.

Um richtig den Moment, in dem die Verschiebung des Bildes nach links ganz sichtbar wird, bestimmen zu können, hätten wir bei zwei Kranken spezielle Untersuchungen angestellt.

KRANKER St. S.

	I.			II.			III.				IV.					V. u. M.	Bemerkungen.
	M.	W.	T.	2K.	2S.	1K. 1S.	3K.	3S.	2K. 1S.	2S. 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.		
I	..	..	7	..	26	20	3	..	20	15	2	..	3	..	3	3K. 2S. / 1	12. V, 08. 8 Morgens vor der Tbk-Einsptzg.
	7%			46%			38%				8%					1%	5,800 Leukocyten
II	..	..	9	..	26	24	3	5	13	12	2	..	2	1	1	1S. 4K. / 1 ; 2S. 3K. / 1	12. V, 08. 6.45 Nachm.
	9%			50%			33%				6%					2%	7,800 Leukocyten
III	..	..	6	..	24	18	..	5	19	17	1	..	3	2	4	1S. 4K. / 1	13. V, 08. 8 Morgens nüchtern 21 Stunden nach Tbk-Einsptzg.
	6%			42%			41%				10%					1%	5,200 Leukocyten

Im ersten Falle ordneten wir die Untersuchungen drei Mal während 24 Stunden an.

Dies betrifft den Kranken St. S. (Siehe Taf.)

Im zweiten Falle, in dem 19 Mal die Untersuchungen angestellt wurden, und zwar 8 Untersuchungen während 24 Stunden nach Einspritzung des Beranek'schen Tuberkulins. (Siehe Taf. W. W.)

KRANKER W. W.

	I.			II.			III.				IV.				V. u. m.				Bemerkungen.
	M.	W.	T.	2K.	2S.	1K. 1S.	2K.	3S.	2K. 1S.	2S 1K.	4K.	4S.	3K. 1S.	3S. 1K.	2K. 2S.	5K.	5S.	3K. 2S.	u. s. w.	
1	..	..	6	1	22	25	1	6	19	9	..	..	2	2	6	3S. 2K. / 1				4. V, 1907, 8½ Morgens nüchtern.
	6%			48%			35%				10%					1%				67000 Leukocyten
2	..	..	8	1	19	23	2	4	17	13	3	..	5	..	4	..				9.30 Morgens nüchtern.
	8%			43%			36%				12%					..				9 Uhr Tbkeinspritzg. 82,000 Leukoc.
3	..	1	14	5	15	24	7	2	18	8	1	..	1	..	4	..				10.30 Morgens.
	15%			44%			35%				6%					..				84,000 Leukoc
4	..	..	8	1	27	19	5	1	16	16	..	..	2	..	4	5K. / 1				12.30 Nachm.
	8%			47%			38%				6%					1%				9,300 Leukocyten
5	..	..	9	2	21	33	5	..	16	10	1	..	1	..	2	..				4 Nachm.
	9%			56%			31%				4%					..				9,000 Leukocyten
6	..	..	12	2	24	20	4	3	16	9	2	..	2	..	5	3S. 2K. / 1				6½ Nachm.
	12%			46%			32%				9%					1%				10,400 Leukoc.
7	..	..	13	..	23	20	2	3	22	8	1	..	1	..	7	..				9.30 Abends.
	13%			43%			35%				9%					..				9,800 Leukocyten
8	..	..	9	2	20	16	5	2	21	13	4	..	1	..	6	3K. 2S. / 1				5.V, 1907, 8¾ Morgens.
	9%			38%			41%				11%					1%				6,800 Leukocyten

Diese Untersuchungen hatten uns in der Ueberzeugung befestigt, dass während der negativen Phase sich im Blutbilde Veränderungen nur in geringem Grade zeigen und ihren höchsten Punkt 7 Stunden nach der Tuberkulineinspritzung erreichen. 24 Stunden nach der Tuberkulineinspritzung konnten wir aber nicht nur die Rückkehr des Bildes zu der Norm, aber sogar seine Verbesserung beobachten, denn definitiv sehen wir im letzten Bilde im Vergleiche mit dem ersten eine kleine Verschiebung nach rechts. (Siehe Taf. St. S. u. W. W.)

Dies sind jedenfalls sehr interessante Erscheinungen vom Standpunkte des Zustandes des Organismus in den ersten Stunden nach Tuberkulineinspritzung. Sie können jedoch zu allgemeinen Schlüssen nur dann zulassen, wenn solche Untersuchungen aus einem grossen Krankenmaterial gemacht werden.

Wir wollen am Schlusse alles, was früher gesagt wurde, in kurze Worte fassen. Wie wir am Anfange bemerkt hatten, handelte es sich hauptsächlich darum, ob in Anbetracht der mangelhaften Untersuchungsmethoden in der Tuberkulose und speziell was die Prognose im Verlaufe der Krankheit anbetrifft, wir in der Arneth'schen Methode ein neues, mehr Garantie leistendes Mittel finden werden.

Auf Grund unserer Untersuchungen, die nur ein einziges Mal angeordnet wurden, ist es uns erlaubt, die Ansicht Arneth's zu bestätigen, dass die Tuberkulose als infektiöse Krankheit, vom Standpunkte der Veränderungen des neutrophilen Blutbildes betrachtet, viel deutlicher als andere infektiöse Krankheiten erscheint.

Und wirklich, 8 Fälle ausgenommen (7 im I. Stadium und 1 im II. Stadium), welche ein normales Blutbild darstellten, zeigten alle anderen eine grössere oder geringere Abweichung vom normalen Blutbilde, die bis 98% in der I. u. II. Klasse reichte. Zugleich führten uns dieselben einmal eingestellten Untersuchungen zur Bestätigung des Parallelismus zwischen dem Grade der Verschlimmerung des Blutbildes einerseits und der Intensität des krankhaften Prozesses andererseits, in 19 Fällen. In zwei Fällen fehlte der Parallelismus.

Was die Untersuchungen anbelangt, die wir mehrfach zwecks Feststellung auf Grund des Blutbestandes im Verlaufe des krankhaften Prozesses angeordnet hatten, konnten wir bei 22 aus 26 Kranken die Harmonie der Veränderungen des Blutbildes mit den Veränderungen in dem Zustande der Kranken konstatieren. In 10 Fällen nämlich, bei denen wir eine Verbesserung des Blutbildes fanden, entsprach ein günstiger Verlauf der Krankheit und zwar eine Verbesserung dem Allgemein- und Lungenzustande. In 11 folgenden Fällen entsprach die Verschlimmerung des Blutbestandes der Verschlimmerung des Allgemein- und Lungenzustandes. Die betreffenden Verbes-

serungen und Verschlimmerungen des Blutbildes fanden jedoch in engeren Grenzen statt, als Verschlimmerungen und Verbesserungen des Lungen- und Allgemeinzustandes, was wir schon bei der Besprechung der einzelnen Fälle erwähnten.

In einem Falle bestätigte die Unveränderlichkeit des Blutbildes während eines ganzen Monates den Allgemein- und Lungenzustand, der auch in derselben Zeit sich nicht veränderte.

In restierenden 4 Fällen konnten wir diese Harmonie nicht finden, denn in 3 Fällen hatte sich der Blutbefund verschlimmert, in einem im *status quo* geblieben, indessen hatte sich sowohl der Lungen- wie der Allgemeinzustand in allen 4 Fällen verbessert. Vielleicht lässt sich diese Uneinigkeit durch das weitere Schicksal der Kranken nach dem Verlassen der Anstalt erklären. Davon kann man aber leider nicht immer berichtigt werden. Für bessere Orientierung in unseren Schlüssen fügen wir folgende Tafel hinzu.

	Blutuntersuchungen.				
	Mehrmalige.			Einmalige.	
	Verbesserung.	Verschlimmerung.	Status quo.	Zwischen Blutbefund und klinischem Zustand.	
				Parallelismus.	Ohne Parallelismus.
Im Blutbefunde	10 Fälle	15 Fälle	2 Fälle	26 Fälle	2 Fälle
Im klin. Zustande.....	14 Fälle	12 Fälle	1 Fall		

Die kleine Zahl unsere Untersuchungen, die sich durch verschiedene technische Schwierigkeiten erklären lässt, berechtigt uns natürlich nicht, weitgehende Schlüsse zu ziehen. Aber dieses spärliche Material erlaubt uns dennoch zu sagen, dass die Arneth'sche Methode ernste Dienste in der ganzen Reihe komplizierter mit der Klinik der Tuberkulose verbundener Fragen leisten kann.

Aus diesem Grunde glauben wir, sollte sie zeitig in Betracht gezogen werden. Insofern wir aus der uns zugänglichen Literatur urteilen können, hatten diese Untersuchungen in der Praxis nicht viel Anwendung gefunden. Es wäre sehr erwünscht, wenn ihnen in den Sanatorien und in den klinischen Abteilungen für Phthisiker ein korrespondierender Platz angewiesen wäre.

ZUR KENNTNIS DES REINEN PNEUMOTHORAX OHNE EXSUDAT BEI LUNGENTUBERKULOSE.

Von Dr. Hermann von Schrötter,
Wien.

Dasjenige worüber ich des näheren an der Hand von Tabellen und des Röntgenbefundes sprechen wollte, ist das noch nicht hinreichend gewürdigte Vorkommen jenes Pneumothorax bei Tuberkulose, der in den initialen Stadien derselben ohne Exsudation vorkommt. Bei Individuen, die früher anscheinend gesund waren, tritt ohne besonderes Accident Luft in den Pleuraraum aus, wobei trotz starker Verdrängung des Mediastinums die Erscheinungen relativ geringfügige sein können. Dabei kommt es vor, dass auch die objektiven Symptome so unbedeutende oder so wenig charakteristische sind, dass man ohne die Radioskopie bezw. das Spirometer eine sichere Diagnose des Zustandes nicht zu machen imstande wäre. Ebenso gelingt es nicht ohne weiteres, oder erst durch genauere Verfolgung des späteren Verlaufes, den ätiologischen Zusammenhang des Pneumothorax mit Tuberkulose zu beweisen. Der Umstand, dass die Luft in den sonst nicht veränderten Pleuraraum, beim Fehlen von Adhäsion austritt, bietet Gelegenheit, die Verdrängungserscheinungen des Mediastinums, die Respirationsmechanik, die vikarierende Leistung der anderen Lunge in sozusagen reiner Form zu studieren und dabei interessante, noch nicht hinreichend gewürdigte Verhältnisse zu beobachten oder messend zu verfolgen. So können an der maximal gegen den Hilus retrahierten Lunge Pulsationsphänomene nachgewiesen, die Ventilationsgrösse, die Lungenkapazität und der Gaswechsel, wie bei der künstlichen Ausschaltung einer Lunge studiert werden.

Mittels der Radioskopie und unter gleichzeitig kontrollierender Anwendung des Spirometers kann man den Gang und die Geschwindigkeit der spontanen Rückbildung des Pneumothorax bezw. der Wiederentfaltung der Lunge feststellen. So lässt ein auffallendes Defizit in der Vitalkapazität von 1000 bis 1500 cm.^{3} gegenüber der Norm, namentlich bei einem bereits von früher bekannten Individuum, schon an sich die Diagnose auf (neuerlichen) Luftaustritt in den Pleuraraum stellen, während die sonstigen physikalischen Zeichen zweifelhaft sind. Interessant ist nämlich ferner, dass sich der beschriebene Zustand bei solchen Individuen, die mit einer

bloss umschriebenen Spitzenaffektion behaftet sind, 2 bis 3 Mal wiederholen kann, wobei nur geringfügige Schwankungen in den Erscheinungen und der Rückbildung des Pneumothorax unterlaufen.

Ich selbst habe an der k. k. III. medizinischen Universitätsklinik in Wien 4 diesbezügliche Fälle gesehen und davon namentlich 2 des genaueren in der angedeuteten Richtung zu verfolgen Gelegenheit gehabt. Von diesen lebt der eine Patient, K. N., und kommt in regelmässigen Zwischenräumen zur Untersuchung, wobei nun mehr, und zwar etwa 1 Jahr nach der letzten Rezidive des Pneumothorax, deutliche Symptome einer Affektion des linken Oberlappens aufgetreten sind, die früher fast vollkommen fehlten. Der andere Patient, A. A., dessen Abbildungen ich ihnen hier zeige, ging nach zweimaliger Rezidive nach mehrjährigem Verlaufe an schliesslich rapid zunehmender Phthise zugrunde, wie wohl nach der Ausheilung seiner ersten Pneumothorax-Attaque ebenfalls keine präzisen Zeichen einer spezifischen Erkrankung der Lunge nachzuweisen waren.

Um Ihnen ein Beispiel zu geben, wie rasch sich eine dieserart retrahierte Lunge spontan zu entfalten vermag, führe ich einen 23-jährigen Mann, F. Sch., an, bei welchem dieser Vorgang 33 Tage in Anspruch nahm, wobei die Vitalkapazität bezw. das Volumen der betreffenden Lunge in den ersten 17 Tagen, *pro die* im Mittel um 33 cm.^{3}, in den folgenden 16 *pro die* im Mittel um 58 cm.^{3} zunahm, bis das Defizit von rund 1500 cm.^{3} wieder gedeckt war. In diesen Fällen erfolgt die Entfaltung der Lunge gegen Ende zumeist rascher; in dem angezogenen Beispiele etwa 1.7 Mal schneller als in der ersten Zeit. Bezüglich des Gaswechsels erwähne ich von dem 17-jährigen Patienten, A. A., dass der Sauerstoffverbrauch (Bettruhe) während der Pneumothorax bestand, um zirka 14% gegen jenen unter normalen Verhältnissen gesteigert war, ein Befund, der auf die erhöhte Atem- und Herzarbeit zu beziehen ist. Die Ventilationsgrösse ist in den in Rede stehenden Fällen meist deutlich erhöht; mehrfach konnte ein Minutenvolumen im Mittel von 10.5, 1. bei 22 Respirationen konstatiert werden.

Doch ich will hier auf diese Verhältnisse nicht näher eingehen, da dieselben noch in einer ausführlichen Publikation eingehend mitgeteilt werden sollen.

Was die Literatur anlangt, so bemerke ich hier nur, dass die Heilung des trockenen Pneumothorax ohne Exsudat zuerst von L. von Schrötter beschrieben wurde. Aus neuer Zeit liegen, abgesehen von anderen Erfahrungen unserer Klinik—mit Bezug auf das Röntgenbild—Mitteilungen von H. Curschmann und von H. Hildebrand vor.

Ich brauche nicht zu betonen, dass die genaue Kenntnis des Verlaufes solcher Fälle auch für die Beurteilung des therapeutischen Wertes des künstlichen Pneumothorax (Forlanini, Murphy, Brauer, und andere) von Wichtigkeit ist.

Recognition of Pure Pneumothorax, without Exudate, in Pulmonary Tuberculosis.—(VON SCHRÖTTER.)

The subject which I will more fully discuss with the aid of tables and radiograms is that of pneumothorax occurring without exudate in the initial stages of tuberculosis. In individuals who were formerly apparently well and without any special accident, air enters the pleural cavity. In spite of marked displacement of the mediastinum, the symptoms may be relatively trivial. Similarly, the objective symptoms may be so indistinct or so uncharacteristic that it would be impossible to make a certain diagnosis without the aid of a radioscope or the spirometer. The etiological connection of the pneumothorax with tuberculosis can only be determined by other investigations or by a careful and prolonged study of the later course of the case. The fact that pleural adhesions are absent and that the air enters into a normal pleural cavity affords the opportunity to study the phenomena of mediastinal displacement, the mechanism of respiration, and the vicarious labor of the unaffected lung, in what might be called its "pure form." It is also possible to follow out by observation or measuring interesting phenomena which as yet have not been sufficiently appreciated. Thus, on the lung whose maximal retraction is toward the hilum, the phenomena of pulsation can be demonstrated. One can also study the change in the size of the lung during respiration, the lung capacity and the respiratory gaseous interchange as well as if the one lung had been artificially removed.

By means of the radioscope, controlled by the simultaneous employment of the spirometer, one can study the course and rapidity of the spontaneous disappearance of the pneumothorax, or, what amounts to the same, the reëxpansion of the lung. A deficiency in the vital capacity of a patient amounting to 1,000 to 1,500 c.c., particularly in an individual already studied, of itself permits a diagnosis of (recent) entrance of air into the pleural cavity, even though the remaining physical signs are doubtful. It is of further interest that the above-described condition may recur two or three times in individuals with small, circumscribed apical affections, while only slight variations occur in the manifestations and absorption of the pneumothorax.

I have seen four of the above-described cases in the k.k. III. Medical-University Clinic, and have been able to study two of them along the lines just laid down. One of these patients (K. N.) still lives and comes at regular intervals for examination. He now shows (one year after the last recurrence of his pneumothorax) definite symptoms of an affection of the left upper lobe which had formerly been completely free. The other patient (A. A.), whose picture is here shown, died after two attacks of pneumothorax. The course of the disease extended over several years

and toward the end was rapid, although after the healing of his first attack of pneumothorax, definite signs of specific disease of the lung could not be demonstrated.

The case (F. Sch.), a man of twenty-three years, may be given as an example of how rapidly the lung, retracted in this manner, may spontaneously reëxpand. The whole process covered a period of thirty-three days. During this time the vital capacity, or, what is the same, the volume of the affected lung, increased on an average at the rate of 33 c.c. daily for the first seventeen days and at an average rate of 58 c.c. during the next sixteen days, until the deficiency, amounting to 1500 c.c., was entirely made up. In this case the reëxpansion of the lung occurred more quickly toward the end of the process—about one and seven-tenths times faster than during the first period.

Gaseous interchange was studied on a seventeen-year-old patient (A. A.). In this patient the consumption of oxygen (patient in bed) during the pneumothorax attack was increased 14% above the normal. This increase is to be explained by the increased breathing and the increased work of the heart. The ventilation capacity in the cases under discussion was distinctly increased. Several times the per-minute volume was found to average 10.5 L., with the respiratory rate at 22 per minute.

A more detailed consideration of these phenomena will be given in a later publication.

In regard to the literature on the subject, I merely remark here that the recovery of the dry form of pneumothorax without exudate was first described in detail by L. Von Schrötter (1868). Without mentioning other experiences in our own clinic, there are at hand, of later date, reports from H. Curschmann and from H. Hildebrand.

I need not accentuate the fact that the accurate knowledge of the course, or complete history of such cases, is of great importance for the purpose of judging the therapeutic value of artificially produced pneumothorax (Forlanini, Murphy, Brauer, and others).

DER ABLAUF DER LUNGENTUBERKULOSE UNTER DEM EINFLUSS DES KÜNSTLICHEN PNEUMOTHORAX.

Von Dr. Lucius Spengler,
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Im Laufe der letzten zwei Jahre habe ich in einer Reihe von Fällen den Einfluss des künstlichen Pn. Th. auf die Heilungsvorgänge bei Phthisikern beobachten können. Zur Auswahl brachten wir für die neue Therapie nur solche Patienten, denen gegenüber ein ernstes Eingreifen in jeder Hinsicht berechtigt und nach Lage der Dinge notwendig erschien. Meine Arbeiten und Beobachtungen habe ich gemeinsam mit Brauer (Marburg) und andern Mitarbeitern durchgeführt. Mich selbst drängten zum Studium der Pn. Th.-Therapie, wie sie von Murphy, Forlanini und Brauer in den letzten Jahren geübt worden ist, meine Beobachtungen bei Patienten mit natürlichem Pn. Th. oder mit grossen pleuritischen Exsudaten. Mit Bezug auf letztere möchte ich daran erinnern, dass man bei sehr rasch ansteigenden, rasch grosswerdenden Pleuraexsudaten stets daran denken muss, ob nicht ein geringfügiger, die Pleura nicht schwer infizierender Pn. Th. die Ursache derartiger Exsudate ist. Oft findet man über solch grossem Exsudate sowohl physikalisch wie im Roentgenbild ganz deutlich das kleine Luftbläschen. Speziell vor dem Roentgenschirm verrät sich letzteres durch die absolut scharfe Einstellung der oberen Exsudatgrenze.

Der therapeutische Pneumothorax stellt—es kann dieses nicht scharf genug betont werden—eine Behandlungsmethode dar, die nur unter sorgfältigster Abwägung der prognostischen Lage des Patienten durchgeführt werden darf. Ganz im Einklang mit den kritischen Ausführungen Murphys sind auch wir an diese Behandlungsmethode herangegangen, ohne jeden Enthusiasmus, kühl und kritisch von Fall zu Fall erwägend, aber doch dort uns mutig entscheidend, gedrängt von dem Wunsche zu helfen, wo wir Recht und Pflicht sahen, dem Patienten das Verfahren zu empfehlen. Unter scharfer Hervorhebung dieses Gesichtswinkels seien die nachfolgenden günstigen Erfahrungen hier mitgeteilt.

Unsere Beobachtungen werden demnächst eine eingehende Darstellung in einer grösseren Publication finden.

Die Indication zur Anlegung eines künstlichen Pn. Th. liegt hauptsäch-

lich in dem Bestande eines im wesentlichen einseitigen und ausgedehnteren Prozesses, somit bedarf die sogenannte gesunde Seite einer vorherigen sehr exacten und wenn möglich einige Zeit durchzuführenden Controlle.

Inactive Prozesse der andern Seite stellen durchaus keine Contra-Indication dar. Leichtere katarrhalische Prozesse in der Spitze des Oberlappens der gesunden Seite und wohl auch leichte beginnende Infiltration daselbst, werden durch den Collaps der kranken Lunge allem Anschein nach eher günstig beeinflusst und zwar unserer Meinung nach deswegen, weil durch die nicht collabierende Lunge reichlich Blut durchfliesst. Letztere Auffassung wird allerdings nicht von allen Seiten geteilt. Irgendwelche frischere, namentlich in Bewegung befindliche Prozesse der andern Seite stellen dagegen eine absolute Contra-Indication dar, denn es ist nicht zu vergessen, dass an die gesunde Lunge zunächst etwas erhöhte Ansprüche hinsichtlich Atmung, Husten etc. gestellt werden.

Der Bestand breiter Pleuraadhäsion macht die Anlegung eines künstl. Pn. Th. unmöglich. Wir haben in solchen Fällen mehrfach die Indication einer breiten, extrapleuralen Thoracoplastik gestellt und mit diesem fertig durchdachten Postulat dann die Fälle Herrn Friedrich (Marburg) zur Operation zugeführt.

Zur Beurteilung der Frage, ob Adhäsionen bestanden, haben wir alle gebräuchlichen, wie auch die seltener geübten physikalischen Untersuchungsmethoden herangezogen, so z. B. auch die Beobachtung des Litten'schen Phänomens.

Trotz allem kommt man aber doch häufig nicht zu einer bindenden Entscheidung darüber, ob der Pleuraraum frei ist oder nicht, sodass man in solchen Fällen dann eben einen kleinen Eingriff unternehmen muss, der bei bestehender Verwachsung ja so gut wie belanglos ist.

Die Technik des künstlichen Pn. Th. ist durchaus zu sondern in die Technik des ersten Eingriffes und die Nachpunktionen.

Der erste Eingriff hat unbedingt unter Anlegung eines Schnittes und Freilegung der Pleura costalis zu geschehen, ein Verfahren, wie es im wesentlichen von Murphy zuerst empfohlen wurde. Die Punktion nach Forlanini ist lebensgefährlich, wie wir und andere erfahren haben, und zwar deswegen, weil sie die Gefahr der Luftembolie mit sich bringt. Man bedenke, dass man nicht in gesundes Lungengewebe punktiert, in welchem die Venen und Arterien der eindringenden Nadel ausweichen, sondern dass man die Nadel in Infiltrationsgewebe hineinbringt und dass in diesen die Gefässe der Nadel nicht so glatt auszuweichen vermögen.

Die Nachpunktionen sind im allgemeinen ungefährlich, vorausgesetzt, dass man nicht den Druck im Pn. Th.-Raum übermässig steigert, sowie dass sich eine grössere, im Roentgenbild klar zu diagnostizierende Luftblase durch den ersten Eingriff gewinnen liess, und so die eindringende Nadel sicher den

Luftraum, nicht das kranke Lungengewebe trifft. Die Druckcontrolle üben wir durch Einschaltung des vorliegenden Manometers aus. Im allgemeinen gilt, dass mittelgrosse, umschriebene Pn. Th., die dem Herzen nicht gerade direkt anliegen, sehr wohl höhere Druckwerte vertragen, während ganz grosse Pn. Th. zumeist mit einem Druckwert, der 5 mm. Quecksilber nicht überschreitet, fortgeführt werden sollten.

Sputum-Aspiration in die gesunde Lunge haben wir nie beobachtet.

TAFEL I.—PNEUMOTHORAX.

Censuren: I; II; III; IV; V.

Patient.	Erfolg.	Patient.	Erfolg.
No. 1.	Schwartenemphysem.	No. 18.	V.
No. 2.	I.	No. 19.	I.
No. 3.	Schwartenemphysem.	No. 20.	II–III.
No. 4.	I–II.	No. 21.	II–III.
No. 5.	I.	No. 22.	Misslungen.
No. 6.	II.	No. 23.	I.
No. 7.	II.	No. 24.	I.
No. 8.	I.	No. 25.	II.
No. 9.	Schwartenemphysem.	No. 26.	I.
No. 10.	IV.		
No. 11.	I.	No. 27.	Misslungen, dann *extrapleurale Thoracoplastik* mit Erfolg I.
No. 12.	I.		
No. 13.	I.		
No. 14.	III.	No. 28.	Misslungen, dann *extrapleurale Thoracoplastik* mit Erfolg I.
No. 15.	V.		
No. 16.	IV.		
No. 17.	I.		

Résumé:

1. *Für Pneumothorax:*

I; I–II; II	15 Fälle.	
II–III; III	3 Fälle.	
IV; V	4 Fälle.	22
Pn. Th. unmöglich resp. Lockerung der Schwarten	4 Fälle.	4
Summe	26 Fälle.	26

2. *Für Thoracoplastik:*

I (Pn. Th. unmöglich)	2 Fälle.	2
Summe	28 Fälle.	28

Zur Vereinfachung der Darstellung habe ich die Fälle, welche wir behandelten, auf der beigegebenen Tafel I zusammengestellt und daselbst das Resultat in Form der Censierung zum Ausdruck gebracht, wobei der beste Erfolg durch die Note 1, der schlechteste Erfolg durch die Note 5 bezeichnet wird. Sie sehen aus der Zusammenstellung, dass bei 28 Kranken die Anlegung eines künstlichen Pn. Th. versucht wurde. Sechs Mal war diese unmöglich wegen bestehender Pleuraverwachsungen. Bei den 22 Fällen, bei welchen ein Pn-

Th. erreicht wurde, war der Erfolg 15 Mal, oder in mehr als $\frac{2}{3}$ dieser Fälle, ein guter, 3 Mal ein mittlerer und 4 Mal ein schlechter. Von den 6 Patienten, bei denen die Anlegung eines Pn. Th. unmöglich war, unterzogen sich 2 später einer extrapleuralen Thoracoplastik und zwar mit sehr gutem Erfolg.

Vergleichen wir die Resultate dieser in Davos behandelten Fälle mit den Resultaten bei jenen Kranken, die unter dürftigen Verhältnissen in und ausserhalb des Krankenhauses in der Ebene behandelt wurden, so sehen wir, wie Brauer betont, das weit günstigere Resultat selbstverständlich bei den wohlhabenderen Kranken des Kurortes. Das unter beiden Bedingungen ausgewählte Material an Kranken war mit Bezug auf die Schwere des Leidens vollständig gleich.

Es sind weitere 32 Fälle, die ausschliesslich von Brauer in Marburg behandelt wurden. Die obenerwähnte gemeinsame Publikation wird daher über 60 Fälle verfügen.

Wie wichtig es ist, vor Anlegung des Pn. Th. das Verhalten der andern Seite genau zu studieren, habe ich bereits erwähnt. Nach Anlegung des Pn. Th. sahen wir in nur 3 Fällen die andere Seite sich verschlimmern. In 2 von diesen 3 Fällen trat lange Monate nach Bestand des Pn. Th. im Anschluss an eine Influenzainfection eine Verschlechterung der andern Seite auf. In dem 3. Fall (Fall 15) trat die Verschlechterung sehr bald nach Anlegung des Pn. Th. ein und es ist recht wahrscheinlich, dass bei diesem in der Ernährung und in seinem Kräftezustand überaus herabgekommenen Menschen der Pn. Th. Anteil hatte an dem Zustandekommen dieser Verschlimmerung. Es handelte sich hier um einen in den letzten, schwersten Stadien einer hoffnungslosen Krankheit liegenden Mann.

Höchst interessant für den Ablauf des Heilerfolges, auch wichtig, ist die Art, wie sich im Pn. Th.-Raum die Pleura verhält. Ernste Pleuraveränderungen sahen wir eigentlich nur bei den allerschwersten und elendesten Kranken.

Sie erkennen aus der Tafel, dass nur bei dem schon genannten Fall 15 eine tuberkulöse Pleuritis aufschiesst. In einem solchen Falle ist die Pleura dann eben nicht mehr bacteriendicht, wie wir dies aus dem Verlauf schwerer Tuberkulosefälle ja nur zu genau wissen. Bei der grossen Mehrzahl unserer Sanatoriumsfälle blieb der Pn. Th.-Raum dauernd trocken. Bei 2 Kranken (No. 2 u. 6) trat ein steriler, zellarmer, seröser Erguss auf, welcher Temperaturverlauf und Befinden der Patienten nur vorübergehend und leicht beeinflusste. Mit dem Einsetzen dieser Ergüsse wurde der Stickstoff weit langsamer als zuvor resorbiert, die Lunge bleibt nun ruhiger in gleichmässiger Kompression. Den Patienten wurde ein häufigeres Nachpunktieren erspart, sodass also im ganzen das Auftreten dieser Ergüsse eher günstig für die Kranken ist.

Steigen die Exsudate sehr rasch an, so ist rechtzeitig zu einer entlasten-

		Wenige.
L.		Spärlich.
		O.

R.		Viele.
		O.
R.		O.
		O.

KÜNSTLICHER PNEUMOTHORAX (TABELLE II).

Die Angaben über der punktierten Linie beziehen sich auf die Zeit vor der Operation, die unter der punktierten Linie auf die Zeit nach der Operation.

Nr.	Kranke Seite	Dauer der Krankheit bis zur Aufnahme	Fieberfrei vor der Operation.	Datum der Operation.	Art des Pneumothorax.	Exsudat.	Temperatur	Gewicht	Puls	Senkungsgeschw.	Bacillen.	Elastische Fasern	Albumin.	Hämoptoe.	Allgemeinbefinden.	Andere Seite.
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
R.	1 Jahre.		Pleuritis sicca dext.	Juni 9, 1906.	Schwarten-emphysem.	O.	Dauernd erhöht.	66.0 Kgr.	74 96.	15–50 ccm. p. Tag.	Gaffky VII.	Ziemlich viele.	O.	Oft.	Dauernd gestört.	Gesund.
						O.	Dauernd normal bis zur Erkrankung der anderen Seite	73.0 Kgr.	70–88.	5–10 ccm. p. Tag.	Gaffky IV.	Mässig viele.	O	O.	Sehr gut bis zur Erkrankung der anderen Seite.	Nach 1½ Jahren erkrankt durch frische Infection.
L.	1 Jahr.		O.	Juni 26, 1907.	Komplet.	O.	Hektisch.	45.5 Kgr.	88 116.	50.0 ccm. p. Tag.	Gaffky X.	Zahlreich	O.	Einmal	Sehr schlecht	Leicht erkrankt.
						Seros, steril; Punction.	O.	57.5 Kgr.	72–80.	O	O.	O.	O.	O.	Sehr gut.	Gebessert.
L.	5 Jahre		Pleuritis exsudativa beiderseits	Feb. 17, 1907.	Schwarten-emphysem.	O.	Normal.	70.4 Kgr.	68–84 p. Min	Etwa 70 ccm.	Gaffky IV	Viele.	O	O	Wenig gestört.	Leichter inaktiver Process in Spitze
						O.	Vorübergehend erhöht.	67 8 Kgr	68 84.	Etwa 20 ccm.	Idem.	Massig viele.	O.	O	Besser.	Gebessert.
L.	7 Jahre		O.	Marz 7, 1907.	Komplet	O.	Oefter Schube.	67.2 Kgr.	60–76.	20 ccm.	Gaffky VI.	Zahlreich.	O	Einmal.	Wenig gut.	Leichter inaktiver Process in Spitze
					Diplococcenexsudat		Nur während Exsudat erhöht	67 6 Kgr.	60–76 p. Min	O.	O	O	O	O	Sehr gut	Gebessert
L.	9 Jahre.		O.	Marz 8, 1907.	Komplet.	O.	Sehr haufige Schube	74.3 Kgr	80–94.	10–30 ccm.	Gaffky II	Massig viele	O	O.	Oft gestort.	Ganz leichter inaktiver Process in der Spitze.
						O.	O	72 1 Kgr	72 80	O	O.	O	O	O	Sehr gut; Hoerath	Gebessert.
R	9 Jahre.		Pleuritis sicca rechts.	April 3, 1907.	Anfangs in-komplet, nach einigen Monaten fast komplet.	O.	Hohes Fieber während 4 Monaten	48.5 Kgr.	100–120.	60–90 ccm. p. Tag.	Gaffky VI.	Ziemlich viele	O.	O.	Sehr gestört.	Ganz leichter inaktiver Process
						Seroses Exsudat	Normal.	54 0 Kgr	80–90.	20 30 ccm p. Tag	Gaffky I.	O.	O	O.	Sehr gut.	Gebessert
R	6 Jahre		O.	Juni 1, 1907.	Fast komplet.	O.	Oft Schube.	65 6 Kgr	60 80 p. Min	60 ccm	Gaffky VII	Sparliche	O	Oft.	Oft gestort.	Leicht erkrankt.
						O.	Normal.	65 8 Kgr	60 72 p. Min	20 ccm	Gaffky V.	O	O.	O	Sehr gut.	Gebessert.
L.	1 Jahr		Kleiner seroser Erguss	Juni 1, 1907	Komplet.	O.	Oft Schube bis über 39.0	75 0 Kgr	88 90	10 15 ccm	Gaffky VI	Sparliche	O	Dreimal	Gestort	Leichter inaktiver Process
						O.	Normal.	82.5 Kgr.	62–70.	O.	O.	O	O	O.	Sehr gut	Gebessert.
L.	5 Jahre.		O.	Juni 7, 1907.	Schwarten-emphysem.	O.	Normal.	60 Kgr	92.	50–100 ccm.	Gaffky IV VII.	Vorhanden.	O	Zweimal	Ziemlich gut	Leichter inaktiver Process.
						O.	Normal.	60 Kgr	84.	10 30 ccm.	Idem.	Vorhanden.	O.	O	Gebessert.	Unverandert
R.	7 Jahre.		Pleuritis sicca rechts	Juni 8, 1907.	Inkomplet.	O.	Erhoht	55.5 Kgr.	76 88	170–230 ccm p. Tag	Zahlreich.	Vorhanden	1 3% Eiweiss	O	Stark gestort.	Inaktiver Process
						O.	Anfangs normal, dann erhöht	50 0 Kgr	76 88	160–130 ccm p. Tag.	Zahlreich	Vorhanden	1 2% Eiweiss	O	Idem	Verschlimmert.
L.	5 Jahre		O.	Juni 8, 1907.	Komplet.	O.	Oft Schube.	64 0 Kgr	80 100 p. Min	60 ccm p Tag	Gaffky VII	Zahlreich	O	Mehrmals	Oft gestört.	Leichter inaktiver Process
						O.	Normal.	57.5 Kgr.	60 80	0–5 ccm. p. Tag.	O.	O	O	O	Ausgezeichnet.	Gebessert
R	2 Jahre		O.	Juli 1, 1907	Komplet.	O	Fast dauernd erhöht	69.9 Kgr.	80–100.	Zieml gross	Gaffky VIII.	Viele	O	Oft.	Sehr beeintrachtigt	Leichter inaktiver Process
						O	Normal.	72 9 Kgr	61 72	O.	O.	O.	O.	O.	Sehr gut.	Gebessert.
L.	2 Jahr		O	Aug 11, 1907	Komplet	O	Dauernd erhöht	56.5 Kgr	108 124	10 0 ccm	Gaffky V.	O.	O	O	Stets sehr matt.	Normal.
						O	Normal	49 2 Kgr.	160 168 p. Min	5 0 ccm.	O.	O	O.	O.	Gut	Normal.
L.	1 Jahr		Pleuritis sicca links	Aug 14, 1907.	Komplet.	O.	Dauernd erhöht.	57 5 Kgr.	100, oft unregelm	30 ccm	Gaffky VII	Viele	O	O.	Stark gestort	Leicht erkrankt
						O.	Meist normal.	59.0 Kgr	80 84 p. Min.	5 ccm.	Gaffky I–II.	O.	O.	O.	Gut.	Vorubergehend verschlimmert nach Influenza.
R	6 Jahre		Pleuritis sicca rechts.	Sept 14, 1907.	Inkomplet	O.	Fast dauernd erhöht.	57 0 Kgr	90 100.	60 70 ccm.	Gaffky VI.	Zahlreich	O	Haufig.	Stark gestort.	Massig erkrankt
						Tuberculo-ses Exsudat.	Vorubergehend normal, zuletzt Fieber	?	100 120	Vorubergehend vermindert,	Gaffky III.	O.	O.	O	Stark gestort.	Verschlechtert.
R	6½ Jahre		Trockene und exsudative Pleuritis rechts.	Sept 14, 1907	Inkomplet.	O.	Haufig und Lange erhöht	62 8 Kgr.	72 80 p. Min	ures 120 ccm. p. Tag.	Gaffky VI.	Zahlreich.	O.	O	Stark gestort.	Leicht erkrankt
						O.	Oft erhöht, zuletzt normal	52 1 Kgr	80 92 p. Min	Wechselnd 50 ccm. p. Tag.	Gaffky IV.	Zahlreich	O	O.	Stark gestört	Unverandert.
R.	3¼ Jahre.		Mit 10 Jahren Pleuritis sicca. Juli 1906 Pleuritis sicca.	Nov. 9, 1907	Anfangs in-komplet, spater fast komplet, Fibrolysen	O.	Zahlreiche Schube.	68.0 Kgr.	70 80	10–20 ccm. p. Tag.	Gaffky VIII.	Spartlich.	O	Oefter.	Stark beeintrachtigt	Leichter inaktiver Process.
						O.	Normal	70 0 Kgr.	60 72	1–2 ccm. p. Tag.	Gaffky IV.	O.	O.	O	Gut.	Gebessert.
L.	1¼ Jahre		O.	Dez 20 1907	Inkomplet.	O.	Dauernd erhöht	50.5 Kgr.	90 104.	Gering.	Gaffky IV.	Spartlich.	O	O	Massig beeintrachtigt	Frei.
						O.	Fast normal.	59 0 Kgr	60–76	Vermindert.	?	?	O.	O.	Zuerst gebessert; Tod.	Frei.
R	15 Jahre		O	Jan 5, 1908.	Komplet	O.	In den letzten Monaten dauernd Fieber	57.0 Kgr.	100–110.	50 ccm. p. Tag.	Gaffky VI.	Massig viele	O.	Eine.	Sehr gestort	Leichter inaktiver Process.
						O.	Normal	66 0 Kgr	60 72	O	O.	O.	O	O.	Sehr gut	Gebessert
R	10 Jahre		Pleuritis sicca rechts	Jan 24, 1908	Fast komplet.	O.	Oft Schube	64.0 Kgr.	70 80	20 40 ccm	Gaffky VIII.	Reichlich.	O	Mehrere	Stark gestort	Leichter inaktiver Process.
						O.	Fast normal	63 0 Kgr	70 80	10 20 ccm.	O.	O	O	O	Wesentlich gebessert	Gebessert
R	1 Jahr.		O.	Feb 26, 1908	Inkomplet	O.	Dauernd hohes Fieber	61 3 Kgr	120 p Min	120 150 ccm p Tag.	Gaffky VII	Zahlreich.	O	Mehrere.	Stark gestört.	Leichter inaktiver Process.
						O.	Zunachst normal dann wieder Abfall	61 4 Kgr	120 p. Min	10 50 ccm p Tag	O.	O.	O	O.	Gebessert	Gebessert.
R	3 Jahre.		O	Marz 12, 1908.	Meshungen.	O	Brawelen erhöht	58 3 Kgr	92 96	20 ccm.	Gaffky V.	Massig viele.	O.	Mehrmals.	Gestort	Gebessert
						O.	Ebenso.	58 3 Kgr.	Ebenso	Ebenso.	Ebenso	Ebenso	O	Einmal	Gestort	Gebessert
L.	4 Jahre.		O	Marz 24, 1908	Komplet.	O.	Oft Fieberschube.	30 5 Kgr	80 p Min	15–20 ccm. p. Tag	Vorhanden	Vorhanden.	O	O	Wenig gestort	Gesund.
						O.	Normal.	30 5 Kgr	80 p Min	1 2 ccm. p. Tag	O	O	O.	O.	Sehr gut	Gesund
L.	1 Jahre.		Pleuritis sicca links	Marz 30, 1908	Komplet	O.	Viele Fieberschube	48 5 Kgr	100 p Min	40 60 ccm p. Tag	Gaffky VIII	Zahlreich.	O	O.	Stark beeintrachtigt	Leichter inaktiver Process.
						O.	Dauernd normal	48.5 Kgr.	80 p Min	1 3 ccm p. Tag	Gaffky III.	O.	O.	O.	Sehr gut	Gebessert
L.	12 Jahre		O	April 11 1908	Komplet.	O.	Meist normal.	87 0 Kgr	100 bis	150 200 ccm. p. Tag	Gaffky VII.	Massig viele.	O	Mehrmals.		Ganz leichter inaktiver Process.
						Diplococcenexsudat.	Normal; während der Pleuritis Fieber.	80 0 Kgr	90 100	15 20 ccm. p. Tag	Gaffky V.	Wenige	O.	O	Wesentlich gebessert	Gebessert
L.	1½ Jahre		Pleuritis sicca links.	April 28, 1908.	Komplet.	O.	Meist normal	37 0 Kgr	120 p. Min.	150–200 ccm. p. Tag.	Gaffky IV.	Spärlich.	O.	Eine kleine	Wenig beeintrachtigt	Leichter inaktiver Process.
						O.	Dauernd normal.	55.2 Kgr.	120 p. Min.	15–20 ccm. p. Tag.	Gaffky IV.	O.	O.	O.	Sehr gut.	Gebessert.

EXTRAPLEURALE THORACOPLASTIK.

R	11¼ Jahre.	Oft trockene Pleuritis.	Jan. 18, 1908.	Pneumothorax meshungen; Thoracopl.	O.	Fiebert seit Monaten.	59.5 Kgr.	96 108 p. Min.	50 60 ccm. p. Tag	Gaffky VI.	Viele.	O.	O.	Sehr gestört	Inaktiver Process im O. L.
					O.	Normal	57.5 Kgr	84 96 p Min.	20 25 ccm p. Tag.	O.	O	O	O	Sehr gebessert	Gebessert
R.	12¼ Jahre.	O.	Mai 5, 1908.	Pneumothorax meshungen; Thoracopl.	O.	Fiebert seit Jahren.	65.0 Kgr.	100 p. Min, unregelmassig	200 bis 250 ccm. p Tag.	Gaffky III.	O.	O.	O.	Sehr gestört.	Leichter inaktiver Process.
					O.	Normal.	65.0 Kgr.	80–80.	15–20 ccm. p. Tag.	O.	O.	O.	O	Sehr gebessert.	Gebessert.

Ein weiterer Fall von extrapleuraler Thoracoplastik, bei dem der vorherige Versuch eines Pneumothorax nicht gemacht wurde, ist gestorben.

den Punktion zu schreiten, denn es darf nicht ausser Acht gelassen werden, dass sonst der Druck in dem Raum ein zu grosser werden könnte. Bei dieser Entlastung ist aber auch eine stete Druckcontrolle notwendig, damit eine zu starke Drucksenkung die collabierte Lunge nicht allzusehr wieder ausdehnt.

Zweimal (No. 4 u. 25) beobachteten wir nach starken Erkältungen und voraufgehender Angina das Auftreten eines etwas zellreicheren, diplococcenführenden Exsudates. Diese Patienten boten beide zunächst einige Zeit höhere Temperaturen, bei beiden war dann aber der weitere Verlauf teils mit, teils ohne Punktion des Exsudates ein sehr guter. Die Fiebererscheinungen schwanden völlig. Das Exsudat wurde später spontan wieder resorbiert und verhielten sich die Patienten dann genau so wie die eben geschilderten mit dem rein serösen Exsudat.

Unsere Beobachtungen haben somit erwiesen, dass das Verhalten der Pleura keinen entscheidenden Faktor gegen die Anwendung der Pn. Th.-Therapie in sich schliesst. Eines eingehenderen histologischen Studiums wird allerdings das Pleuraverhalten noch bedürfen.

Fassen wir nun, nachdem wir die Schwierigkeiten und das Ungünstige der Pn. Th.-Therapie zur Genüge breit hervorgehoben haben, die Heilerfolge zusammen. Die pathologisch-anatomischen Untersuchungen des Falles, den wir verloren, sowie zweier anderer Fälle, die bei Brauer an der Klinik verstarben, haben gezeigt, dass unter dem Lungencollaps eine ganz überraschende Bindegewebswucherung und bindegewebige Induration sich ausbildet, dass frische Tuberkel in den Collapspartien völlig fehlen oder jedenfalls sehr spärlich sind und dass die verkäsenden Herde auffallend trocken erscheinen. Die eingehende Publication dieser Befunde hat das pathologische Institut in Marburg übernommen.

Die Untersuchung des opsonischen Indexes, welche an unserem Sanatorium durch Pigger vorgenommen wurde, ergab, dass bei einer completen, durch Verwachsungen nicht irgendwie eingeschränkten Compression der Lunge, sehr bald nach Beginn der Therapie der opsonische Index über die Norm anstieg und während der ganzen Dauer der Beobachtung auf normalen Werten stehen blieb. Nur da, wo die Compression durch starke Verwachsungen eine teilweise blieb, resp. anderweitige tuberkulöse Complicationen auftraten, war das Verhalten des opsonischen Indexes ein sprunghaftes. Vielleicht lässt sich aus diesem Verhalten der Opsonine bei künstl. Pn. Th. ein Weg finden zur Erklärung der auffallenden Besserung mancher subjektiver und objektiver Beschwerden der so behandelten Kranken.

Mechanische Schädigungen der Circulation und Respiration sahen wir wohl deswegen nicht, weil wir grossen Wert auf überlegte sehr vorsichtige Druckregulierung im Pn. Th.-Raum setzten.

Die günstige Einwirkung der Pn. Th.-Therapie baut sich allem Anschein

nach auf, teils auf Beeinflussung der Toxin-Resoprtion und Toxinbildung, teils auf eine unmittelbare anatomische Beeinflussung des Krankheitsprozesses. Es hält schwer, diese Dinge bei der Erklärung des Nachfolgenden richtig abzuschätzen.

Ganz auffällig ist häufig der Einfluss auf das subjektive Befinden. Die Patienten werden munter, sie fühlen sich als gesunde Leute. Es ist schwer, ihnen immer wieder in Erinnerung zu bringen, dass trotz allem Guten, was ihnen die Therapie brachte, eine grosse, tuberkulös durchsetzte Masse im Th. noch verblieb. Häufig aber kann man diese Kranken doch nach einiger Zeit wie Gesunde leben lassen und ihnen reichliche Körperbewegung gestatten. Als Rückwirkung sieht man eine Sanierung des gesamten Ernährungszustandes. Es schwindet das übermässige Fett, dessen Entwicklung nun leider einmal mit der hygienisch-diätetischen Kur oft einhergeht, über dessen Bewertung sich aber bekanntlich mancherlei für und wider sagen lässt. Das Sputum ist bei den meisten Kranken zurückgegangen, bei vielen geschwunden und bei der grossen Mehrzahl schwanden die elastischen Fasern und langsam, im Laufe von Monaten sich zusehends vermindernd, endlich gänzlich die Bazillen. Ebenso günstig wurde das Fieber beeinflusst. Die Besserung aller dieser Erscheinungen trat relativ rasch und vollständig ein bei denjenigen Patienten, welche einen completen Pn. Th. darboten, sie kamen etwas verzögerter bei jenen mit, durch Adhäsionen verursachtem, incompletem Pn. Th. In gleicher Weise günstig beeinflusst wurde besonders auf die Dauer die Herztätigkeit und das Aussehen der Patienten. Einige Male sahen wir eine leichte Cyanose, die vordem bestand, völlig zurückgehen.

Wir legen ein Hauptgewicht darauf, dass die Compression der Lunge lange genug, d. h. 1–2 Jahre erhalten bleibt und dann ihre Entfaltung eine allmähliche sei. (Ausgleichen des negativen Druckes bei den letzten Nachpunktionen.) Eine 3–6 Monate andauernde Compression genügt nicht und zwar besonders nicht bei alten Phthisen mit grossen, compakten Herden. Die Fähigkeit der Wiederentfaltung der Lunge ist gross und bleibt sehr lange erhalten. Unsere bei 10 Fällen von geheiltem, natürlichem, tuberkulösem Pneumothorax gemachten Erfahrungen haben die Richtigkeit dieser beiden Sätze erwiesen.—(Bruns, "Beiträge zur klinischen Chirurgie," Band XLIX.)

Uebersehen wir somit nochmals in Kürze die Dinge, die ich heute zum Ausdruck bringen möchte. Es lag mir daran, Ihnen zu zeigen, dass wir ohne jeden Enthusiasmus und nur gedrängt durch Misserfolge dazu kamen, an unsern Kranken den Pn. Th. therapeutisch anzulegen. Jeder wird es begreifen und mit uns empfinden, wenn wir scharf betonen, dass das Krankenmaterial eines Sanatoriums für Wohlhabende ein überaus sensibles ist und keineswegs dazu angetan erscheint zu irgendwie gewagten therapeutischen Versuchen. Unseren Kranken, wie uns selbst, waren wir es schuldig, von

jedem Enthusiasmus frei, an die therapeutische Tätigkeit zu gehen, unseren Kranken waren wir aber auch den mutigen Entschluss dort schuldig, wo wir mit unserer sonstigen Kunst am Ende waren.

Sehr zögernd und vielleicht unter etwas übertreibender Schilderung des Risikos und der mit dem Pn. Th. zusammenhängenden Gefahr sind wir an die ersten Fälle gegangen. Sehr zögernd haben wir auch weiterhin von Fall zu Fall uns entschlossen und nur denjenigen Kranken den ernstlichen Rat zur Anlegung des Pn. Th. erteilt, die selbst und deren Angehörige zu der vollen Erkenntnis des Ernstes der Situation gekommen waren. Dieses ist der Boden, auf dem unsere Erfolge erwuchsen, die ich Ihnen gerne schilderte, da sie vielen unserer Patienten von allergrösstem Nutzen waren. Neben dem Erfolg habe ich mich aber auch bemüht, sehr deutlich und klar die Schwierigkeiten und die Misserfolge erkennen zu lassen. Wir werden als Aerzte, die wir hier versammelt sind, wohl alle wissen, dass bei so ernst and ausgedehnt erkrankten Tuberkulösen eben nur noch einem beschränkten Prozentsatze zu helfen ist. Wir werden deswegen aber doch den Mut haben müssen, mit unseren Kranken in ein Wagnis zu gehen, wenn wir ohne dieses sie für verloren wähnen. Nie dürfen wir in der Medizin vergessen, dass von dem Arzte auch die männliche Entschlossenheit verlangt werden muss, eines Tages nach aller Sorgfalt der Abwägung und aller Kritik und Vorsicht doch auch rechtzeitig zu einem entscheidenden Entschlusse zu kommen. Nie möge man vergessen, dass Kritik und Objektivität es erfordern, nicht nur das Ungünstige im therapeutischen Vorgehen und die Schwierigkeiten zu sehen, sondern auch das Gute scharf und nüchtern hervorzukehren, unbeschadet darum, ob es Menschen gibt, die im ewigen Verneinen und abwägenden Kritisieren das A und O kritischer Kunst sehen und die das mutvolle positive Erkennen mit angeblichem Enthusiasmus zu verschleiern suchen. Ganz besonders neuen und im Ausbau befindlichen Behandlungsmethoden gegenüber gilt dieses Wort. Möge die zweifellos nutzbringende Behandlungsmethode Murphys und Forlaninis kritischen Händen zufallen, möge die Methode bewahrt werden vor enthusiastischer Verwendung am unpassenden Ort, dann werden Sie alle auch dieser Richtung der Behandlung Ihre Aufmerksamkeit zuwenden und mit den Jahren Nützliches erwachsen sehen.

CONTRIBUTIONS TO PHYSICAL METHODS OF DIAGNOSIS.

By C. E. Waller, M.D.,
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I. Is Percussion as a Method of Testing the Lungs Deserving of Greater Attention?

The author first points out the essential difference in principle that exists in the way in which the two methods of examining the lungs, viz., percussion and auscultation, are usually employed. In auscultation it is the character of the respiratory sound that is directly observed, the inspiration, the expiration, râles, etc.; whereas in percussion, by reason of the importance attached to the symmetrical-comparative method, the investigation does not, as a rule, proceed farther than to the examination of the difference in the percussion sound produced at two particular spots which are compared, and consequently does not arrive at the really essential point of the percussion, viz., the establishing of the special character of the percussion sound itself.

Next, the shortcomings of the symmetrical-comparative method are more particularly pointed out; these are summarized in the two following statements:

1. If there be a dullness in the percussion sound heard at two symmetrical spots, and the difference in the degree of dullness is indistinct, as is not infrequently the case, the dullness may remain unnoticed at both spots.

2. If there be a dullness in the percussion sound heard at two symmetrical spots, and the difference in the degree of dullness is distinct, which often occurs, the dullness at the spot where the degree of dullness is greater may be miscalculated, *i. e.*, underestimated, and the dullness at the other spot be neglected altogether.

If it is remembered, furthermore, that dullness in cases of tuberculosis of the lungs usually occurs on both sides of the lungs,* it will be clear that there must exist another shortcoming of this method as a corollary of those above mentioned, and one which has been still less observed than they. That is, that the degree of dullness in general, even, and indeed more especially, when it is considerable, is regularly underestimated, and this to

* C. E. Waller: "En studie i perkussion af lungorna," Hygiea, 1904, p. 125.

such an extent, that it is actually a very rare thing to find a high degree of dullness registered in, for instance, medical reports.*

The author gives examples of this by showing how seldom one comes across any notice of a high degree of dullness, even, for instance, in Turban's casuistry of cases in the third stage of the disease in his famous work, "Beiträge zur Kenntniss der Lungentuberkulose."

It is emphatically pointed out that it is absolutely necessary, in employing the percussion method, to determine the special character of the percussion sound. Among the percussion sounds to be heard from the lungs the author distinguishes three principal kinds: (1) the so-called non-tympanitic, (2) the relâchement-tympanitic, and (3) what he at the suggestion of Levi Bergström calls the tracheal-tympanitic sound.

The author discusses the character of the non-tympanitic sound in different stages of the development of tuberculosis of the lungs, from the incipient stage right on to the cavity, showing thereby that these characteristics give a basis for the determination of the presence and degree of dullness quite independently of the symmetrical-comparative method.

Then the author describes his own new percussion method, already published in "Hygiea" in 1904, adding here such modifications and developments in the method as have since then been made.

This is how it runs in summarized form:

I. *Weak Percussion.*

(*a*) The non-tympanitic sound is heard throughout the respiration, but somewhat, or distinctly, short: First Degree of Dullness (sign: D^1).

(*b*) The non-tympanitic sound is heard only during a portion of the respiration, when the breathing is ordinary or forced: Second Degree of Dullness (sign: D^2).

(*c*) The non-tympanitic sound is not heard.

The degree of percussion is increased to:

II. *Medium Percussion.*

(*a*) The non-tympanitic sound is heard: Third Degree of Dullness (sign: D^3).

(*b*) The non-tympanitic sound is not heard.

The degree of percussion is increased to:

III. *Strong Percussion.*†

(*a*) The non-tympanitic sound is heard: Fourth Degree of Dullness (sign: D^4).

* Loc. cit.

† Of course, it is not here a question of a medium or strong tap in the ordinary sense, but only of a less "slight" or "still less slight" tap.

(*b*) The non-tympanitic sound is not heard: Fifth Degree of Dullness (sign: D^5).

By this new method, for some years employed by a number of Swedish doctors, it is possible to determine the different degrees of dullness with greater accuracy, so that, for instance, a difference in the degree of dullness from one examination to another can be more readily determined, and the different degrees of dullness, particularly the higher ones, be more correctly estimated; the method also enables the examiner to detect without any great difficulty an incipient dullness at an earlier stage than what is now generally the case. Besides that, it is noticed that, when this method is employed, different examiners are, relatively speaking, much more in agreement in their determinations of the degree of dullness present than they were before. The results can, furthermore, be arrived at without recourse being had to the symmetrical-comparative method at all. The latter method ought consequently to be relegated to a subordinate place, analogous to one occupied by the similar method applied in conjunction with auscultation.

In view of the known difficulties offered by percussion at the fossæ supraclavicularis and supraspinata, as pointed out by Isak Jundell in a monograph* deserving attention, and by others, the following practical advice may be given to any one intending to adopt the new percussion method: Begin the percussion of the back and the front, not at the fossæ above mentioned, but at the places which under normal conditions yield a clear and full percussion sound, viz., in front at the fossa infraclavicularis somewhat external to its center, and on the back in the neighborhood of the angulus scapulæ in the spatium infrascapulare or in the trigonum stethoscopicum.

Percussing the back offers special points of interest. If on beginning, for instance, at the trigonum stethoscopicum on the left side, you find the non-tympanitic sound, and then proceed, making the percussion from below upward, being careful to notice when this sound is no longer heard at a slight tap (is superseded, for instance, by the relâchement-tympanitic sound), you will, as a rule, find, on applying the same method of percussion on the other, the right side, that the border of the audible non-tympanitic sound reaches further down on that side, where a higher degree of dullness is heard in front at the fossa infraclavicularis.

The author explains next why the number of five degrees of dullness has been considered suitable. By subdividing the dullness of light percussion into two degrees, greater attention is paid to these slighter degrees of dullness, which consequently will not so readily escape observation. The medium degree of dullness, D^3, which is of frequent occurrence both in

* Bemerkungen zur Percussion der Lungenspitzen. Zentralblatt für innere Medizin, 1904, No. 17.

milder and in more severe cases of lung affection, should, of course, exist as a separate category. Finally, the two degrees of dullness with strong percussion (D^4 and D^5) cannot but be differentiated, and that on account of a special reason. It is, namely, in the fifth degree of dullness (D^5), that the strange phenomena of sound variation, noticed long ago by Wintrich and others, are almost exclusively to be found. Whenever D^5 occurs, those phenomena must be expected. The fifth degree of dullness consequently constitutes in itself a reply to the hitherto unanswered question: When is one to look for the sound-variation phenomena? Moreover, with this guidance one meets with the phenomena much oftener than formerly, when it was, so to say, only by accident that one came across them. The author gives examples of that by citing similar cases from his own and Turban's casuistries. To help us to detect Wintrich's phenomenon more readily, the author recommends the employment of a new technical detail in percussion. The indirect percussion, as we know, should, as a rule, be made with a slight tap on the pleximeter pressed firmly against the chest wall. There is one exception to this rule, viz., when percussing for the tracheal tympanitic sound. For that sound comes out more plainly, purer, and less obscured by or mixed with other sounds, if the examiner does not press the pleximeter finger (the author prescribes the almost exclusive use of finger percussion) firmly on the underlying structures, but, holding it straight and firm by its extensor and flexor tendons, allows the ball of the finger to pass lightly over the skin while percussing "staccato" with the hammer-finger (the top or the ball of the finger) on the back of the last phalanx of the pleximeter finger. The direct percussion of the tracheal tympanitic sound, for instance, on the clavicle is produced by a tap, not with the top of the finger, as usual, but with the ball of the finger.

The essay concludes with the following summing up of its contents:

1. By noticing the varying character of the non-tympanitic sound, by different strength of percussion, dullness can be detected and its degree established with more certainty than otherwise and quite independently of the symmetrical-comparative percussion method.

2. The symmetrical-comparative percussion method as usually applied is insufficient and illusory for the determination of the presence and degree of dullness; it should therefore not occupy the prominent position it now does.

II. The Pulse-Rhythmic Respiratory Sound.

After a statement of the views at present held by Eichhorst, Sahli, Turban, Brecke, Henssen, Aufrecht and others, regarding the systolic vesicular breathing and the saccadated respiratory sound, the author gives the result of his own observations, and points out that both the saccadated and the systolic respiratory sounds are characterized by the inspiratory, and some-

times also expiratory, sounds of respiration not being uniform throughout but increasing undulatory, and that these increases, the saccades, always occur simultaneously with the rhythmic beats of the pulse.

After having come to that conclusion himself, the author had Henssen's essay* brought to his notice, in which that writer asserts that the saccadated breathing is, as a rule, pulse-rhythmic. It may seem strange that this observation, which appears so simple, was not made earlier, or at any rate that more attention was not paid to it after Henssen's essay appeared. This strange fact may be explained, however, by the circumstance that, not only for the discovery itself, but also for the control of its correctness, a simultaneous observation of two phenomena is obligatory, viz., the saccadation and the pulse-wave (or the cardiac systole), and, besides that, a conception of their synchronism; consequently a comparatively complicated exercise of the mental faculties.

The two phenomena should for the future be grouped together under one heading. The one suggested by Henssen appears suitable to the author: *the pulse-rhythmic respiratory sound.*

When saccadation is observed to be present both at the inspiration and the expiration, the rhythm is heard to be the same, that is to say, the saccades are pulse-rhythmic both in the inspiration and the expiration. This shows how untenable is the assumption that the phenomena are dependent on the negative systolic pressure in the thoracic cavity resultant from systole (Potain and others). That pressure might possibly explain the rhythmic increase of the respiratory sound during inspiration, but not during expiration, where one would expect to find a rhythmic decrease of the sound, which is not the case.

As regards the localization of the pulse-rhythmic respiratory sound, the author states that it occurs in the vicinity of the large blood-vessels and the heart; he mentions specially the fact that it is to be heard also on the back, near the aorta thoracica. As the spots most favorable for its detection (termed together a pulse-rhythmic center, the author mentions the second right intercostal space (on the auscultation spot for the aorta), the second left intercostal space (on the auscultation spot for the aorta pulmonalis), in the first intercostal spaces on either side (also in the neighborhood of the sternum), and in the region of the heart. On the back it may be heard in the vicinity of aorta thoracica, *i. e.*, in the spatium interscapulare on the left side from the height of the processus spinosus of the fifth thoracic vertebra downward past the scapula to the base of the lung. In cases of "situs inversus viscerum" the localization of the systolic respiratory sound is reversed, which the author had the opportunity of observing in one case.

The pulse-rhythmic respiratory sound arises in the following way:

* Deutsches Archiv für klin. Medizin, 1902, Bd. 74, S. 230.

The tissue of the lungs in those parts of the lungs that are situated near the large blood-vessels and the heart is subject to a mechanical pressure by every pulse-wave in the vessels and by every heart-movement in systole. Thereby the delicate air-passages, with their soft compressible walls, within which the vesicular sound is produced, become narrowed, and the velocity of the current of air increased at every pressure; the rapidity of the current of air, thus increased in a pulse-rhythmic manner, occasions an intensifying of the respiratory sound, so that it is heard louder in proportion to the rhythm of the pulse.

The author states that he has occasionally heard another saccadation in addition to the ordinary systolic ones. It is always much fainter than the systolic one, but it is to be heard simultaneously with the diastole, a fact which has led the author to compare the saccadation to an acoustic pulse-curve.

Finally, it is pointed out that the saccadations very often disappear when the breathing is forced, and that to discover the phenomenon the examiner must wait for a moment when the pulse-wave strikes the lung tissue during an audible part of the respiratory sound, preferably at inspiration.

The pulse-rhythmic respiratory sound is a phenomenon which occurs practically always in patients suffering from tuberculosis of the lungs. The systolic vesicular breathing has likewise been long known to occur very commonly both in healthy persons and invalids, and to it, as a rule, no pathological import is attached. As the result of the author's investigations goes to show that there is no distinction between a saccadated and a systolically intensified respiratory sound, and that both arise from the same cause, it may be assumed that the pulse-rhythmic respiratory sound is not to be regarded as a pathological sign, at any rate for the lungs. But supposing the pulse-rhythmic respiratory sound is to be heard plainly and extending far outside the pulse-rhythmic center, and especially in the fossæ supraclavicularis and supraspinata and in the lower back part of the right lung, *i. e.*, in spots which are, relatively speaking, rare for its occurrence, an observation should be made of the organs of circulation, more especially of the heart and its workings.

SPECIFIC AIDS IN THE DIAGNOSIS AND PROGNOSIS OF TUBERCULOSIS.

By Silvio von Ruck, M.D.,
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In the following pages it is my purpose to consider the relative value of specific aids in the diagnosis and prognosis of tuberculosis; first, of tuberculin in its various methods of application; and, second, of the serum reactions, and particularly the agglutinin reaction, in the light of my own investigations as compared with those of others.

With the introduction of tuberculin a most valuable aid was afforded in determining the presence or absence of tuberculous affections in doubtful cases, the interest in which has again been actively aroused since the almost simultaneous and independent communications of Wolff-Eisner[1] and Calmette[2] of their conjunctival method, and of von Pirquet's[3] cutaneous method of applying tuberculin for diagnostic purposes.

From the literature I have collected a large number of results thus far reported, of the subcutaneous, cutaneous, and conjunctival methods respectively, and these are herewith submitted.

By the subcutaneous method among 7088 cases tested there were 4805 tuberculous, in 4319 of which reaction was positive; 479 suspects, in 313 of which reaction was positive; and 2804 non-tuberculous, in 1440 of which positive reaction occurred.

By the conjunctival method, among 6449 cases tested there were 2734 tuberculous, in 2164 of which reaction was positive; 1188 suspects with 687 positive, and 2527 non-tuberculous with 347 positive reactions.

By von Pirquet's cutaneous method among 6504 cases tested there were 2182 tuberculous with 1861 positive reactions; 815 suspects with 550 positive reactions; and 3507 non-tuberculous, in 1109 of which reaction was positive.

The latter figures include results in 900 non-tuberculous children, of whom 149 had reacted positively. Excluding these cases from consideration, we have positive results in 1060 out of 2607 non-tuberculous adults.

The percentages of cases in which positive reactions followed the application of the test were respectively:

	Tuberculous.	Suspects.	Non-tuberculous.
Subcutaneous	89.88%	63.34%	51.3 %
Conjunctival	79.2 %	57.8 %	13.73%
Cutaneous	85.29%	67.48%	31.62%
Cutaneous, exclusive of children	..	..	40.66%

At the Winyah Sanitarium, since 1891, tuberculin has been injected for diagnostic purposes in 300 cases, with positive reaction in 75 per cent., at a period of the disease in which tubercle bacilli were absent from the sputum or there was no expectoration.

The conjunctival method has been applied in 127 cases, 101 tuberculous and 26 non-tuberculous. Of the tuberculous, 23 were cured or arrested cases which had been treated specifically and discharged from one to ten years previously, and whose health had remained good. Thirty-four were at the time under treatment with specific remedies; the additional 44 cases were tested on admission to the institution and had not been treated.

For the tests, solutions of the alcoholic precipitate of tuberculin, prepared according to Calmette from tuberculin from human tubercle bacilli, and also an identical preparation from bovine bacilli were used. The results are given in detail, with the number of instillations and solution-strengths of the respective preparations, in the tabulations below.

CONJUNCTIVAL TUBERCULIN TESTS. (WINYAH SANITARIUM.)

I. Cases on Admission.

	Stage.	T. B.	Fever	Preparation.	Reactions.				Cutan.	Agglutin.
					Right.	Left.	Rt.	Lt.		
1....	II	+	0	1% H. P. T. 1% B. P. T.	I. sl. ..	.. II	.. ..	.. ..	tr. ..	1 : 25 ..
2....	II	0	0	1% H. P. T. ½% B. P. T.	I. sl. ..	.. —	.. ..	.. ..	+ ..	1 : 20 ..
3....	II	..	+	1% H. P. T.	I	..	..	..	..	1 : 25
4....	I	+	0	1% H. P. T. 1% B. P. T. 1% Control	—	.. I ..	.. .. —	.. .. ..	sl.	1 : 25 .. ..
5.... Cachectic.	III	+	+	1% H. P. T.	I	..	..	..	..	1 : 25
6....	II	+	0	1% H. P. T.	I	..	..	..	+	1 : 25
7.... Miliary, Lungs.	I	+	+	1% H. P. T.	I	..	..	..	tr.	1 : 10

CONJUNCTIVAL TUBERCULIN TESTS. (WINYAH SANITARIUM.)—(*Continued.*)

	STAGE.	T. B.	FEVER.	PREPARATION.	REACTIONS.				CUTAN.	AGGLUTIN.
					Right.	Left.	Rt.	Lt.		
8....	II	+	0	1% H. P. T.	—	..	..	..	+	1 : 25
				1% B. P. T.	..	I. sl.	..	..	..	..
				1% Control	..	..	..	—	..	..
9....	I	0	0	1% H. P. T.	—	..	..	..	+	1 : 25
				1% B. P. T.	..	—	..	..	..	..
				1% H. P. T.	..	..	II	..	..	..
				1% B. P. T.	..	..	..	I	..	..
10....	I	+	0	1% H. P. T.	—	..	..	..	..	1 : 25
				1% B. P. T.	..	I. sl.	..	..	..	..
11....	II	+	+	1% H. P. T.	—	..	..	..	..	1 : 5
				1% B. P. T.	..	I	..	..	+	..
				1% H. P. T.	..	..	I	..	..	..
				1% Control	..	..	..	—	..	..
12....	II	+	0	½% H. P. T.	I	..	..	..	+	1 : 25
				1% B. P.T.	..	I	..	..	..	..
13....	I	0	0	1% H. P. T.	I. sl.	..	..	..	+	1 : 25
				1% B. P. T.	..	—	..	..	..	..
14....	I	+	0	1% H. P. T.	I	..	..	..	+	1 : 20
				1% B. P. T.	..	I	..	..	..	..
15....	II	0	+	1% H. P.T.	I	..	..	..	—	1 : 25
				½% B. P. T.	..	I. sl.	..	..	..	..
16....	II	+	+	1% H. P. T.	I. sl.	..	..	..	—	1 : 15
17....	II	+	0	1% H. P. T.	—	..	..	..	—	1 : 20
Child.				1% B. P. T.	..	—	..	..	..	..
18....	I	0	0	1% H. P. T.	—	..	..	..	—	1 : 10
				1% B. P. T.	..	I	..	..	..	..
19....	I	+	0	1% H. P. T.	I	..	..	..	—	1 : 20
20....	II	+	0	1% H. P. T.	—	..	..	..	—	1 : 10
				1% B. P. T.	..	—	..	..	..	..
21....	II	+	+	1% H. P. T.	II	..	..	..	—	1 : 10
				1% B. P. T.	..	I	..	..	..	..
22....	II	+	+	1% H. P. T.	II	..	..	..	—	1 : 25
				1% B. P. T.	..	I	..	..	..	..
23....	II	0	+	1% H. P. T.	—	..	..	..	sl.	1 : 25
24....	II	+	+	1% H. P. T.	—	..	..	..	—	1 : 25
				1% B. P. T.	..	I. sl.	..	..	..	..
				1% Control.	..	..	..	—	..	..
25....	II	+	+	1% H. P. T.	I. sl.	..	..	..	—	1 : 25
26....	I	0	0	1% H. P. T.	—	..	..	..	..	1 : 25
27....	II	+	0	1% H. P. T.	I. sl.	..	..	..	+	1 : 10

CONJUNCTIVAL TUBERCULIN TESTS. (WINYAH SANITARIUM.)—*(Continued.)*

	Stage.	T. B.	Fever.	Preparation.	Reactions.				Cutan.	Agglutin.
					Right.	Left.	Rt.	Lt.		
28....	I	0	0	1% H. P. T. ½% B. P. T.	I ..	.. I	.. ..	.. ..	.. ..	1 : 10 ..
29....	II	+	+	½% B. P. T. 2% H. P. T.	.. I. sl.	I ..	.. ..	.. ..	— ..	1 : 25 ..
30....	II	+	0	½% H. P. T. 1% B. P. T.	I ..	.. I	.. ..	.. ..	+ ..	1 : 25 ..
31....	I	0	0	½% H. P. T. ½% B. P. T.	— ..	.. —	.. ..	.. ..	.. ..	1 : 5 ..
32....	II	+	0	1% H. P. T.	II	..	..	..	+	1 : 25
33....	I	0	0	2% H. P. T. 1% B. P. T.	I ..	.. I	.. ..	.. ..	+ ..	1 : 20 ..
34....	III	0	+	2% H. P. T.	I	..	..	..	+	1 : 25
35....	I	0	0	2% H. P. T.	I. sl.	..	..	..	+	1 : 20
36....	III	+	+	2% H. P. T.	I. sl.	..	..	..	—	1 : 25
37....	II	+	0	1% H. P. T.	I	..	..	..	tr.	1 : 25
38....	III	+	0	1% H. P. T. 1% B. P. T.	I ..	.. —	.. ..	.. ..	— ..	1 : 5 ..
39.... Cachectic.	III	+	+	1% H. P. T. 1% B. P. T.	— ..	.. —	.. ..	.. ..	.. ..	1 : 10 ..
40....	..	..	..	2% H. P. T. 1% B. P. T.	— ..	.. —	.. ..	.. ..	— ..	1 : 20 ..
41....	I	0	0	1% H. P. T. 1% B. P. T.	— ..	.. —	.. ..	.. ..	tr. ..	1 : 10 ..
42....	I	0	0	1% H. P. T. ½% B. P. T.	I ..	.. I	.. ..	.. ..	.. ..	1 : 10 ..
43....	I	0	0	1% H. P. T. 1% B. P. T. 2% H. P. T.	—	.. I. sl. ..	.. .. —	.. .. ..	?	1 : 15 .. ..
44....	III	+	+	1% H. P. T. 1% B. P. T.	I ..	.. I	.. ..	.. ..	— ..	1 : 20 ..

CONJUNCTIVAL TUBERCULIN TESTS. (WINYAH SANITARIUM.)—(*Continued.*)

II. CASES UNDER SPECIFIC TREATMENT.

	Fever.	Preparation.	First Instillation.		Second Instillation.		Has been Treated.	Cutan.	Agglutin.
			Right.	Left.	Rt.	Lt.			
1....	+	1% H. P. T.	—	..	..	..	6 mos. Wat'y Ext. T. B. human.	tr.	..
		½% B. P. T.	..	I	..	..	..	..	..
2....	+	1% H. P. T.	I. sl.	..	..	..	4 mos. ditto.	—	1 : 200
		1% B. P. T.	..	I	..	..	..	..	..
		1% Control.	..	..	—	..	..	..	..
3....	0	1% H. P. T.	I. sl.	..	..	..	10 mos. ditto.	not made	1 : 100
		1% B. P. T.	..	II	..	..	..	..	..
4....	0	1% H. P. T.	I. sl.	..	..	..	1 mth. ditto bov.	tr.	1 : 225
		1% B. P. T.	..	I. sl.	..	..	..	..	..
		1% Control.	..	..	—	..	..	..	..
5....	0	1% H. P. T.	I. sl.	..	..	..	2 mos. ditto human.	tr.	1 : 25
		2% H. P. T.	..	..	—	..	..	..	..
6....	0	1% H. P. T.	—	..	..	..	10 mos. ditto.	..	1 : 170
7....	0	1% H. P. T.	—	..	..	..	10 mos. ditto.	tr.	..
		1% B. P. T.	..	I	..	..	..	..	..
		1% Control.	..	..	—	..	..	..	..
8....	0	1% H. P. T.	—	..	..	..	10 mos. ditto.	+	1 : 200
		1% B. P. T.	..	I. sl.	..	..	..	..	..
9....	0	1% H. P. T.	—	..	..	..	3 mos. ditto.	+	..
		1% B. P. T.	..	II	..	..	..	..	..
10....	0	1% H. P. T.	I	..	..	..	3 mos. ditto bov.	+	1 : 100
		1% B. P. T.	..	I	..	..	..	..	..
		1% Control.	..	..	—	..	..	..	..
11....	0	1% H. P. T.	—	..	..	..	6 mos. ditto hum.	—	1 : 125
		1% B. P. T.	..	I	..	..	..	..	..
12....	0	1% H. P. T.	—	..	..	..	10 mos. ditto.	+	1 : 175
		1% B. P. T.	..	—	..	..	..	..	..
13....	0	1% H. P. T.	—	..	..	..	12 mos. ditto.	+	1 : 200
		1% B. P. T.	..	—	..	..	..	..	..
14....	0	1% H. P. T.	I. sl.	..	..	..	..	+	1 : 150
15....	+	1% H. P. T.	I. sl.	..	..	..	1 mth. ditto bov.	..	..
16....	0	1% H. P. T.	—	..	..	..	4 mos. ditto. hum.	tr.	1 : 125
		1% H. P. T.	..	..	—	..	..	..	..
		1% Control.	—	..	..	..	..	..	..
17....	0	1% H. P. T.	I. sl.	..	..	..	11 mos. ditto.	tr.	1 : 200
		½% B. P. T.	..	III	..	..	..	..	..
		1% Control.	..	..	—	..	..	..	..
18....	0	1% H. P. T.	I	..	..	..	7 mos. ditto.	..	1 : 100

CONJUNCTIVAL TUBERCULIN TESTS. (WINYAH SANITARIUM.)—(*Continued.*)

	Fever.	Preparation.	First Instillation.		Second Instillation.		Has been Treated.	Cutan.	Agglutin.
			Right.	Left.	Rt.	Lt.			
19....	0	1% H. P. T.	I	..	..	..	6 mos. ditto.	tr.	1 : 175
20....	0	1% H. P. T.	—	..	..	..	5 mos. ditto.	sl.	1 : 75
		1% B. P. T.	..	III	..	..	..	..	..
21....	0	1% H. P. T.	—	..	..	..	18 mos. ditto. for last 3 mos. hum.	—	1 : 375
		1% H. P. T.	..	I	..	..	Emuls. in addit. n.	..	..
22....	0	1% H. P. T.	I. sl.	..	..	..	1 mth. Wat. Ext. h.	—	1 : 20
		1% B. P. T.	..	I	..	..	..	..	..
		1% Control.	..	..	—	..	..	..	..
23....	0	1% H. P. T.	—	..	..	..	1 mth. Emuls. hum.	tr.	1 : 50
		1% Control.	..	..	—	..	..	..	..
24....	0	1% H. P. T.	—	..	..	..	18 mos. Wat'y Ext. hum.	+	1 : 300
		1% B. P. T.	..	II	..	..	..	..	..
		1% Control.	..	..	—	..	..	..	..
25....	0	1% H. P. T.	II	..	..	..	6 mos. ditto.	tr.	1 : 150
		1% B. P. T.	..	I	..	..	..	..	..
26....	0	1% H. P. T.	II	..	..	..	1 mth. ditto bov.	tr.	1 : 30
		1% B. P. T.	..	I	..	..	..	..	..
27....	0	1% H. P. T.	I	..	..	..	2 mos. Emuls. h.	..	1 : 100
		1% B. P. T.	..	—	..	..	..	..	..
28....	0	1% H. P. T.	—	..	..	..	10 mos. Wat'y. Ext. hum.	..	1 : 300
		1% B. P. T.	..	I. sl.	..	..	..	..	..
29....	0	1% H. P. T.	—	..	..	..	10 mos. ditto.	..	1 : 250
		½% B. P. T.	..	tr.	..	..	..	..	..
30....	0	1% H. P. T.	—	..	..	..	6 mos. ditto.	..	1 : 150
		1% B. P. T.	..	—	..	..	..	..	..
31....	0	1% H. P. T.	I. sl.	..	..	..	..	+	1 : 150
		1% B. P. T.	..	I	..	..	..	..	..
32....	+	1% B. P. T.	..	I	..	..	4 mos. ditto.	Late.	1 : 100
		1% Control.	—	..	..	..	2 mos. Wat'y. Ext. b.	..	..
33....	0	1% B. P. T.	..	I. sl	..	..	7 mos. ditto b.	sl. tr.	1: 75
		1% H. P. T.	—	..	..	..	..	..	..
		1% H. P. T.	..	..	..	—	..	..	..
		1% Control.	..	..	—	..	..	..	..
34....	0	1% H. P. T.	—	..	..	..	4 mos. ditto.	tr.	..
		1% B. P. T.	..	I	..	..	..	..	..

CONJUNCTIVAL TUBERCULIN TESTS. (WINYAH SANITARIUM.)—(*Continued.*)

III. CURED CASES.

	PREPARATION.	REACTIONS. Right.	REACTIONS. Left.	TREATED WITH:	DISCHARGED.	CUTAN.	AGGLUTIN.
1....	1% H. P. T.	—	..	Wat'y. Ext. T. B. human.	4 yrs. Appar. cured.	Not made.	1 : 150
	1% B. P. T.	..	—	..	..	..	..
2....	1% H. P. T	—	..	ditto	3 mos. ditto.	Not made.	1 : 100
3....	1% H. P. T.	—	..	ditto.	5 yrs. ditto.	Not made.	1 : 150
	1% B. P. T.	..	tr.	..	..	..	..
4....	1% H. P. T.	—	..	ditto	1 yr. Arrested.	+	1 : 250
	1% B. P. T.	..	—	..	..	..	..
5....	1% H. P. T.	—	..	ditto	3 yrs. Appar. cured.	+	1 : 200
	1% B. P. T.	..	I	..		..	..
	1% H. P. T.	I	..	..	..	..	..
6....	1% H. P. T.	—	..	ditto	2 yrs. ditto.	tr.	1 : 275
	1% B. P. T.	..	I	..	..	..	..
7....	1% H. P. T.	—	..	ditto	4 yrs. ditto.	Not made.	1 : 200
8....	1% H. P. T.	—	..	ditto	1 yr. ditto.	—	..
	1% B. P. T.	..	—	..	..	..	..
9....	1% H. P. T.	—	..	ditto	2 yrs. ditto.	+	1 : 225
10 ..	1% H. P. T	—	..	ditto	10 yrs. ditto.	?	1 : 100
	1% B. P. T.	..	—	..	..	..	..
11....	1% H. P. T.	—	..	ditto	2 yrs. ditto.	+	..
	1% B. P. T.	..	—	..	..	..	..
12....	1% H. P. T.	—	..	ditto	9 years ditto.	Not made.	1 : 100
13....	1% H. P. T.	—	..	ditto	7 yrs. ditto.	+	..
	1% B. P. T.	..	III	..	..	..	..
14....	1% H. P. T.	—	..	ditto	10 yrs. ditto.	tr.	1 : 125
	1% B. P. T	..	I. sl.	..	..	..	..
15....	1% H. P. T.	—	..	ditto	3 yrs. ditto.	..	1 : 100
16....	1% H. P. T.	—	..	ditto	10 yrs. ditto.	+	..
	1% B. P. T.	..	—	..	..	..	..
17....	1% H. P. T.	—	..	ditto	5 yrs. ditto.	—	..
	1% B. P. T.	..	I	..	..	..	..
18....	1% H. P. T.	—	..	ditto	3 yrs. ditto.	..	1 : 175
19....	1% H. P. T.	—	..	ditto	8 yrs. ditto.	tr.	1 : 100
	½% B. P. T.	..	—	..	..	..	..
20....	1% H. P. T.	—	..	ditto	10 yrs. Arrested.	sl.	1 : 200
	1% B. P. T.	..	—	..	..	..	..
21....	1% H. P. T.	..	—	ditto	6 yrs. appar. cured.	..	..
22....	1% H. P. T.	—	..	ditto	4 yrs. Arrested.	..	1 : 100
23....	2% H. P. T.	—	..	ditto	1 yr. appar. cured.	+	1 : 225
	1% B. P. T.	..	—	..	..	..	..

CONJUNCTIVAL TUBERCULIN TESTS. (WINYAH SANITARIUM.)—(*Continued.*)

IV. NON-SUSPECTED CASES.

	PREPARATION.	FIRST INSTILLATION.		SECOND INSTILLATION.		THIRD INSTILLATION.		CUTAN.
		Right.	Left.	Right.	Left.	Right.	Left.	
1.....	1% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
	2% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	..	..	..	..	—	..	..
2.....	1% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
	2% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	..	..	..	..	—	..	..
3.....	1% H. P. T.	—	..	..	..	..	..	tr.
	1% B. P. T.	..	—	..	..	..	..	..
	2% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	..	..	..	..	—	..	..
4.....	1% H P. T.	—	..	..	..	..	..	+
	1% B. P. T.	..	—	..	..	..	..	..
	2% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	..	..	..	..	—	..	..
5.....	1% H. P. T.	—	..	..	..	..	..	tr.
	1% B. P. T.	..	—	..	..	..	..	..
	2% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	..	..	..	..	—	..	..
6.....	1% H. P. T.	—	..	..	..	..	..	+
7.....	1% H. P. T.	—	..	..	..	..	..	+
	1% B. P. T.	..	—	..	..	..	..	..
8.....	1% H. P. T.	—	..	..	..	..	..	Not made.
9.....	1% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
10.....	1% H. P. T.	—	..	..	..	..	..	—
11.....	1% H. P. T.	—	..	..	..	..	..	Not made.
12.....	1% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
13.....	1% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
	2% H. P. T.	..	..	—	..	..	..	..
	2% H. P. T.	..	..	..	..	—	..	..
14.....	1% H. P. T.	—	..	..	..	..	..	+
	1% B. P. T.	..	—	..	..	..	..	..
15.....	1% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
16.....	1% H. P. T.	—	..	..	..	..	..	Not made.
	½% B. P. T.	..	—	..	..	..	..	..
17.....	1% H. P. T.	—	..	..	..	..	..	tr.
	1% B. P. T.	..	—	..	..	..	..	..
	2% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	—	..	..	..	—	..	..

CONJUNCTIVAL TUBERCULIN TESTS. (WINYAH SANITARIUM.)—(*Continued.*)

	PREPARATION.	FIRST INSTILLATION.		SECOND INSTILLATION.		THIRD INSTILLATION.		CUTAN.
		Right.	Left.	Right.	Left.	Left.	Right.	
18.....	1% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
	2% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	..	..	..	..	—	..	..
19.....	1% H. P. T.	—	..	..	..	..	..	Not made.
	1% B. P. T.	..	—	..	..	..	..	..
20.....	1% H. P. T.	—	..	..	..	..	..	Not made.
21.....	2% H. P. T.	..	—	..	..	..	..	Not made.
	½% B. P. T.	—	..	..	..	..	..	..
22.....	2% H. P. T.	—	..	..	..	..	..	+
	1% B. P. T.	..	—	..	..	..	..	..
	4% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	..	..	..	..	—	..	..
23.....	2% H. P. T.	—	..	..	..	..	..	+
	1% B. P. T.	..	—	..	..	..	..	..
	4% H. P. T.	..	..	—	..	..	..	..
	4% H. P. T.	..	..	..	..	—	..	..
24.....	2% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
25.....	2% H. P. T.	—	..	..	..	..	..	—
	1% B. P. T.	..	—	..	..	..	..	..
26.....	1% B. P. T.	..	—	..	..	..	..	—
	1% H. P. T.	—	..	..	..	..	..	..

Of the 23 cured and arrested tuberculous cases none reacted to instillations of human purified tuberculin into the right eye. In 16 of these bovine tuberculin was instilled into the left eye; 9 failed to react, in 1 there was a trace, in 4 the reaction was positive in the first degree, in 1 in the second degree, and in the other, in which there was a chronic conjunctivitis, a severe third degree reaction, accompanied by fever, occurred. This latter case, however, failed to react to cutaneous application of human tuberculin. These patients had been treated with specific products from human tubercle bacilli.

Of the 34 cases in which the test was made while under specific treatment, instillations of human purified tuberculin were made into the right eye of 33. There was no reaction in 18; while in 15 the reaction was positive; slight in 9, of the first degree in 4, and of the second degree in 2.

Of the 18 cases which failed to react to instillations of human purified tuberculin into the right eye, 14 received purified bovine tuberculin into the left eye, with positive reactions in 11, three proving negative to both preparations. Of 12 other cases which had reacted positively to human, 11 reacted also to bovine tuberculin in the other eye.

Of the 44 tuberculous patients who had received no specific treatment 28, or 63.64 per cent., reacted positively to first instillation of human tuberculin into the right eye. Two additional cases reacted to a second instillation of the same preparation in the same eye. The remaining 14 were negative.

Of the same 44 cases, 30 received also instillations of bovine tuberculin into the left eye. Of these 30, the reaction was positive to both preparations in 14, negative to both in 7, positive to human but negative to bovine in 2, negative to human but positive to bovine tuberculin in 7, to the first instillations respectively. Deducting the 7 cases in which neither preparation caused reaction, we have a total of 37 in which reaction was positive, or 84.09 per cent.

There remain for consideration the 26 non-tuberculous cases, all of which were in good health and free from suspicion of infection. None reacted to instillations of human tuberculin into the right eye, and 10 received second and third instillations up to 4 per cent. solution of this preparation in the same eye with entirely negative results.

Bovine tuberculin in 1 per cent. solution was instilled also into the left eye of 18, with likewise negative results.

Cohn,[4] Levy,[5] Klieneberger,[6] Schenck and Seiffert,[7] Rosenau and Anderson[8] and others have found that clinically non-tuberculous persons react to second or third instillations of tuberculin into the same eye after previous instillations have been negative. It has therefore been objected that such repeated applications cause local hypersensitiveness of the conjunctiva, and thus render the reaction of no clinical value. Roepke,[9] however, denies that in persons free from tuberculosis repeated instillations into the same eye cause reaction, and, moreover, insists that only such repeated instillations of tuberculin in solutions up to 4 per cent. are sufficient to cause reaction in all active tuberculoses.

The negative results of repeated instillations reported by Smithies and Walker,[10] and the writer's own experience in the ten cases already mentioned, incline him to Roepke's view, but the question requires further investigation.

It is of interest to note that the percentages of positive reactions to the first instillation of human tuberculin in my own tuberculous cases bears a very evident relation to the employment of specific medication.

Of 44 cases not treated, reaction was positive in	63.64%
Of 34 cases under treatment, reaction was positive in	44.10%
Of 18 cases under treatment six months or longer the reaction was positive in	27.77%
Of 23 cured or arrested cases which had received specific treatment, reaction was positive in	None.

Such an influence has been observed by others also. Mitulescu[11] reports 6 cases treated specifically, and apparently cured, in all of whom reaction was negative, and like experiences are recorded by Schultz-Zehden,[12] King,[13] Citron,[14] Lenhartz,[15] Damask,[16] and others.

The fact that patients while under specific treatment, as will be shown later, acquire progressive increase of sero-agglutinating power, and that the

specific amboceptor becomes likewise present in greater quantitative degree, would seem to indicate that as specific resistance to the pathogenic action of the tubercle bacillus becomes greater, such patients react to tuberculin with less and less frequency, and finally not at all.

It may be asserted, therefore, that the conjunctival tuberculin test may supply the final proof of a cure, just as subcutaneous injections of tuberculin have been administered for the same purpose. In a former publication jointly with Dr. Karl von Ruck,[17] I have called attention to the value of the tuberculin test in this respect, which Heron[18] considers as corollary to the diagnostic value of tuberculin.

The test has also been practised thus by Bandelier,[19] Holdheim,[20] and by Mitulescu,[21] who considers as actually cured only cases which fail to react to tuberculin.

Further prognostic inferences I have been unable to draw from my own studies thus far, and I have not observed any apparent relation between the degree of reaction to either the conjunctival or the cutaneous test, and the severity or extent of the disease which would lead to the modification of a prognosis based upon other considerations.

Therefore, like Klieneberger,[22] Schroeder and Kaufmann,[23] and especially Roepke,[24] I cannot subscribe to the opinions expressed by Stadelmann and Wolff-Eisner,[25] Damask,[26] Heinemann,[27] and Levy[28] in this respect.

Cutaneous tuberculin tests have also been made at the Winyah Sanitarium in 107 cases, both human and bovine tuberculin having been employed in nearly all.

Of 67 clinically tuberculous patients tested with human tuberculin, 50 per cent. solution, positive reaction occurred in 44, in 4 the reaction was doubtful, and in 19 the result was negative. Of these 67 cases, 60 were also tested with bovine tuberculin, 50 per cent. solution; 24 gave a positive reaction, in 1 reaction was doubtful, and in 35 it was negative. Between the two tests in most cases about two weeks elapsed, the human tuberculin having been first employed. The above cases were in most instances receiving specific treatment when the tests were made.

Of 16 cured cases in which the two tests were applied simultaneously, 12 reacted positively to human tuberculin, 50 per cent. solution, 1 was doubtful, and 3 were negative. To bovine tuberculin, 50 per cent. solution, 9 gave a positive and 7 a negative reaction.

Of 24 clinically non-tuberculous persons, mostly tested simultaneously with both preparations: To human tuberculin, 50 per cent. solution, 12 gave a positive reaction, 1 a late reaction (three days), 11 were negative. To bovine tuberculin, 50 per cent. solution, 6 gave a positive reaction, 18 were negative.

In the entire material there were only 4 second-degree reactions to human tuberculin and 3 to bovine tuberculin. In general, the reactions were very mild. In one case, classed as "cured," in which 1 per cent. bovine purified

tuberculin was instilled into the left eye at the same time as both cutaneous tests, the temperature rose to 100.2° F. the next day. The reactions persisted for several days, up to one week, pigmentation being visible for several weeks after vaccination.

For convenience of comparison in individual cases the results of the cutaneous tests are added to the preceding tabulation of conjunctival results. My own experience, like that of many others, has been that the respective results are often contradictory and warrant no definite conclusions. It should be mentioned, however, that with two exceptions those tested were all adults, for whom v. Pirquet himself asserts the method to be unreliable. With Dètre's[29] modification, which consists in substituting the filtrates of respectively human and bovine cultures for the concentrated tuberculin, and by the reaction by which he claims to differentiate the type of infection, I have had no experience. Neither have I tested any patients after Moro's[30] and Lignière's[31] methods.

The specific nature of both the conjunctival and cutaneous tuberculin reactions has been denied by various writers, for reasons similar to those long ago alleged in evidence that the reactions induced by subcutaneous injections of tuberculin should not be so considered. For all three methods it has been objected that reactions occur in health and in other diseases, notably in typhoid fever.

Of 70 cases of the latter affection which I have found recorded in literature, positive reactions followed conjunctival instillation of tuberculin in 20, or in 28.57 per cent. I shall enter into the question of the reaction in typhoid patients more fully when considering the serum reactions. Suffice it here to say that these apparent contradictions can neither militate against the specific character of tuberculin reactions, nor mimimize their diagnostic value, since the percentage of positive results is quite generally in harmony with autopsy findings of tuberculosis in the clinically non-tuberculous, and not only in the adult, but it also corresponds very closely in children to the frequency of infection as shown post mortem with advancing age.

Thus Schreiber[32] reported in 1891 subcutaneous injections of tuberculin, even up to 10 milligrams, as an initial dose, in 40 new-born children with negative results in all. By Binswanger[33] 261 children under one year of age were injected, with positive reactions in 35, or 13 per cent. Forty-two of these came to autopsy, 16 of which had reacted positively, and all of which were found tuberculous. Of the 26 remaining which had not reacted, 25 were found free from tuberculosis.

According to the conjunctival tuberculin test practised in 294 children, Ausset[34] has also confirmed in general the findings as to the frequency of tuberculosis in childhood.

The percentage of positive reaction rises gradually after the first three months of life, as is shown in the following table.

The reaction was positive:

Among	13	infants,	0	to	3	months	old,	in			0	
"	53	"	0	"	1	year	old,	in			8,	or 15.09%
"	31	children	1	"	2	years	old,	in			7,	" 22.5 %
"	23	"	2	"	3	"	"	"			8,	" 34.7 %
"	33	"	3	"	4	"	"	"			12,	" 36.3 %
"	22	"	4	"	5	"	"	"			9,	" 40.9 %
"	17	"	5	"	6	"	"	"			10,	" 58.8 %
"	21	"	6	"	7	"	"	"			9,	" 42.8 %
"	19	"	7	"	8	"	"	"			13,	" 68.4 %
"	10	"	8	"	9	"	"	"			6,	" 60.0 %
"	65	"	9	"	15	"	"	"			38,	" 58.4 %

For the cutaneous method, von Pirquet[35] reports reactions according to age in 988 children, as follows:

	Months.			Years.						
	0-3	3-6	6-12	1-2	2-4	4-6	6-10	10-14	14*	Total.
All cases	147	64	67	86	127	101	182	100	112	988
Positive	..	3	11	21	47	54	106	68	100	407
Percentage	..	5	16	24	37	53	57	68	90	41
Clinically not tuberculous cases	147	50	59	65	92	58	111	64	37	693
Positive	..	..	2	1	11	11	39	35	26	125
Percentage	..	..	3	2	13	17	35	55	70	18

N. B.—The actual total is 986 cases, instead of 988, with 410 (not 407) reactions. There are 683 (not 693) clinically non-tuberculous, with 125 positive reactions.

Similar statistics for both children and adults presented by Petruschky[36] include 460 cases of all ages, in which the age frequency of cutaneous reaction to tuberculin is given below:

Cases.	Age.	Positive.	Percentage.	Negative.
12	6– 9 days	0	0	12
22	1– 6 years	11	50	11
148	7–14 "	114	75	34
69	15–20 "	63	86	6
137	21–30 "	123	87	
56	31–40 "	52	87	4
16	41–76 "	13	81	
460	0–76 years	376	81.7	84

Engel and Bauer[37] also report their results in 280 children, positive cutaneous reactions occurring with progressive frequency as age advances, and varying from 13 per cent. in boys and 20 per cent. in girls in the fourth year of life, to 56 per cent. in boys and 50 per cent. in girls between thirteen and fourteen years of age.

The relation of the percentage of positive reactions to the general frequency of infection as revealed by autopsy thus appears to be fairly constant.

For more reliable evidence we require statistics of autopsy findings in cases which have been tested. Of such statistics I have found but comparatively little in the literature, but have been able to collect 77 cases in which the conjunctival test was applied and in which the positive or negative results were confirmed in 70, or 83.33 per cent. If there be excluded 5 cases in which after negative result autopsy revealed only obsolete tuberculous foci, and in which the reaction might not be expected to occur, the test proved reliable in over 88 per cent. of cases. Of cases tested by the cutaneous method, I have found records of 214 which came to autopsy, in 184, or 85.98 per cent., of which the results were thereby confirmed. Finally, of 54 cases tested by subcutaneous injection the results were proved in all.

The cases as reported are herewith detailed in tabulated form.

AUTOPSY-CONTROLS OF THE CONJUNCTIVAL TUBERCULIN TEST.

Authors.	Cases.	Confirm.	Not Conf.	Remarks
Wolff-Eisner[38]	7	7	0	..
Morelli [39]	15	14	1	The unconfirmed case showed tuberculous ulcer of the intestine.
Blum [40]	7	4	3	The 3 unconfirmed cases were obsolete foci, in which reaction had not occurred.
Damask [41]	9	5	4	Two of the 4 unconfirmed cases showed obsolete lesions. The third had adhesions of both lungs, induration in upper lobes with bronchiectases, and a tubercle with fibrous periphery in cortex of right kidney. The fourth case was cachectic.
Massary and Weil [42]	1	0	1	General carcinoma with positive reaction.
Comby [43]	4	4	..	..
Bourget [44]	3	0	3	One typhoid, 1 hemiplegia, 1 acute peritonitis; all had reacted.
Raviart [45]	9	9	..	..
Hirschler [46]	2	1	1	One suspect with negative reaction showed peritoneal tuberculosis at autopsy. One not suspect with positive reaction revealed at operation tuberculous appendicitis.
Levy [47]	1	..	1	Diabetes mellitus with positive reaction.
Marie et Bourilhet [48]	2	2	..	In 1 case of general paralysis with general reaction, autopsy showed encysted caseous tubercle in right apex.
Fehsenfeld [49]	23	14	7	One negative tuberculous case, with pulmonary gangrene as principal cause of death. One cachectic. In 29 cases
		2	..	the autopsy finding of tuberculosis was doubtful. Two negative children had died of miliary tuberculosis and meningitis.
Goerlich [50]	8	7	1	The unconfirmed case showed renal tuberculosis at autopsy.
	91	69	22	

Confirmation on basis of 69 = 75.82%; on basis of 67 = 73.62%.

AUTOPSY-CONTROLS OF THE CUTANEOUS TUBERCULIN TEST.

Author.	Cases.	Confirm.	Not Conf.	Remarks.
Aronade [51]	17	17	..	All nurslings.
Massini [52]	11	8	3	..
Engel and Bauer [53]	1	..	1	Nursling.
Regli [54]	1	1?	..	Autopsy showed old cicatrix in one lobe.
Lemaire [55]	9	9	..	Children.
Gruener [56]	48	45	3	Two cases of tuberculous meningitis tested one and two days ante mortem. The third case, tested ten days ante mortem, died of diffuse bronchitis with bronchiectasis and double fibrinous pleurisy. Autopsy showed cheesy bronchial glands.
v. Pirquet [57]	123	105	18	Four negative cases with incidental findings of tuberculosis died of lobar pneumonia; 14 cases dead of tuberculosis were all tested within twelve days of death.
Fiesche [58]	21	16	5	..
	231	201	30	

Confirmation on basis of 201 cases = 87.01%; on basis 200 cases = 86.58%.

AUTOPSY-CONTROLS OF THE SUBCUTANEOUS TEST.

Author.	Cases.	Confirm.	Not Conf.	Remarks.
Mettetal [59]	18	18	..	..
France [60]	34	34	..	..
Mikulicz [61]	1	1	..	Carcinoma of pylorus and peritoneum. Autopsy showed an unsuspected old tuberculous focus in one apex.
Diehl [62]	1	1	..	..
	54	54	..	

Confirmation in 100%.

The significance of tuberculin reactions has also been questioned, because, as shown by Matthes,[63] Freymuth,[64] Cabot,[65] and others subcutaneous injection of peptones, albumoses, and the like induced fever and other constitutional phenomena in tuberculous and in non-tuberculous persons, similar to those occasioned by tuberculin. It is to be observed, however, that such effects follow only the injection of doses much larger than those in which tuberculin is active, and, moreover,—and this is of determining importance,—such substances have not the selective action upon tuberculous tissue peculiar to tuberculin.

In the earlier period of tuberculin therapy tuberculous patients at the Winyah Sanitarium were frequently injected with unplanted glycerin-bouillon solutions, and while fever often results, no focal reaction was ever observed in visible tuberculous affections of mucous membranes, nor in the

lungs, as far as could be determined by auscultation. On the contrary, focal reaction has been observed to follow diagnostic injections of tuberculin with such frequency in our experience at the Winyah that we have long considered it as of much more diagnostic import than the general symptoms of fever, malaise, etc.

Among 23 cases with positive reaction to diagnostic injections of tuberculin given in the institution in 1903 and 1904, focal reaction was unmistakable in 21. In the other 2 the previous presence of moist râles made differentiation of the local phenomena doubtful. The significance of focal reactions to tuberculin has also been pointed out by Neisser,[66] Maragliano,[67] Schwalbe,[68] and others.

In the production of fever reactions in the tuberculous, also by subcutaneous injection of bacterial proteins other than those derived from the tubercle bacillus, as shown, for example, by Feistmantel,[69] with streptothrix farcinia, and by Klemperer[70] and by Buchner and Roemer with proteins of bacillus pyocyaneus, there is nothing surprising if the dosage is sufficient; and, as Feistmantel himself says, there is nothing which acts in its injection in mimimal doses upon the tuberculous organism as does tuberculin.

The work of Irimescu[71] with paratuberculin prepared from Moeller's timothy bacillus for conjunctival test (alcoholic precipitate), and with which he obtained 44 positive reactions to first instillations out of 45 surely tuberculous cases, is to be accepted rather as evidence of the specific nature of the test than otherwise, since it illustrates the principles of group reaction. Neither does Irimescu interpret his observations as showing more than the close relationship existing between tuberculins and paratuberculins.

Finally, Fernand Arloing[72] believes he has supplied the positive proof of the non-specific nature of the reaction. Two horses which had been used to obtain anti-diphtheritic serum reacted positively, as did also two horses treated with tetanus toxin, while in untreated horses reaction was negative, but appeared after five weeks of anti-diphtheritic immunization. This author's results lack confirmation, and in controversion thereto Calmette and Guérin[73] report entirely negative results in 23 horses, 8 of which were immunized against diphtheria, 8 against tetanus, and 7 not immunized.

By the subcutaneous method Entz[74] has obtained reactions in tuberculous adults and children to other toxins than tuberculin, as diphtheria, pyocyaneus, and para-typhoid, in about 50 per cent. of cases. To his denial, based upon these results, of the specific nature of the tuberculin test von Pirquet[75] replies that, on the one hand, it has been shown for some toxins (mallein, leprolin, vaccin, and tuberculin) that the organism will react only if there has been a previous infection with the reciprocal microörganism; that, on the other hand, with other toxins (tetanus and diphtheria) such a previous infection is not essential to reaction. These facts, he says, do not invalidate the specific nature of the cutaneous tuberculin test.

That non-specific proteid substances are incapable of causing conjunctival reaction Roepke[76] ascertained in 25 tuberculous patients by instilling a 5 per cent. glycerin bouillon which had first been condensed to one-tenth volume and thereafter diluted. No effect was produced. The writer has further instilled a control preparation, consisting of 1 per cent. solution of the alcoholic precipitate of concentrated glycerin bouillon, into the conjunctival sac in 15 cases, 8 of which had previously given positive reactions to tuberculin, the same eye being used, without in a single instance causing the slightest influence, either general or local.

On the other hand, I have observed in several early cases of apex localization focal reaction to occur simultaneously with reaction of the conjunctiva; the stethoscopic signs became distinctly intensified and crepitation was heard where it had before been absent. Roe[77] also reports a case tested by the conjunctival method in which the occurrence of focal reaction in the lung cleared up the diagnosis, which had been doubtful.

This would indicate that the tuberculous focus is concerned in the reaction. I cannot believe, therefore, that the latter depends upon the local formation of antibodies alone. With the mimimal doses in which tuberculin is thus applied, 1 to 4 milligrams, according to strength of solution employed, part of which is, moreover, often not retained in the conjunctival sac, it is not conceivable that enough would be absorbed into the circulation to produce as manifest and recognizable a focal reaction in a majority of cases as is so frequently observed after subcutaneous injection of tuberculin.

Further than this for lack of space I must refrain from entering into a consideration of the various theories which have been advanced in explanation of the conjunctival and cutaneous reactions, and of the divergent comparative results therewith obtained. As far as I may judge, none has yet been formulated which satisfactorily meets all requirements and is entirely free from objection.

Among the specific aids in the diagnosis and prognosis of tuberculosis I have still to consider the serum reactions, and more particularly the agglutination reaction of Arloing and Courmont, with which my own experience is more extensive. As regards the value of these methods there still prevails a wide diversity of opinion. It was not long after Arloing and Courmont's first publication before the diagnostic significance which they claimed for the sero-agglutination of tubercle bacilli was disputed by other observers, because it was found that not only was the reaction inconstant in tuberculosis, but that it occurred occasionally in other affections, notably typhoid fever, and with the serum of healthy individuals.

Such experiences have caused many to deny that the test has any diagnostic value whatever, among whom may be cited Eisenberg and Keller,[78] who noted but 13 per cent. more positive reactions in tuberculous than in non-tuberculous; also Dieudonné,[79] Beck and Rabinowitsch,[80] von Gebhard

and von Torday,[81] Grazia,[82] and lastly Wright and Douglass,[83] who state that the demonstration of the agglutinating power of serum affords no information of the presence or absence of tuberculosis.

Ferré,[84] Kinghorn,[85] Bendix,[86] Bandelier and others find that in advanced cases of tuberculosis the reaction is often absent or is less pronounced.

Rumpf and Guinard[87] found the reaction positive in 84 per cent. of 107 cases, and Carrière[88] in 75 per cent. of second and third stage cases of phthisis. Berthelon[89] obtained 96 per cent. of positive results in pulmonary tuberculosis, many sera reacting in dilutions of 1 to 15, 1 to 20, and even some as high as 1 to 50.

Hawthorn[90] reports 54 positive reactions out of 57 cases, and failed to obtain positive results in healthy individuals, although in his experience the reaction occurred in other diseases.

Romberg[91] found no agglutination in 33 new-born infants, nor did Descos,[92] whether the mothers were tuberculous or not. Rosenberger[93] obtained complete reaction in dilutions of 1 to 1 in three and 1 to 3 in one, or in a total of four of 39 new-born children.

At the Winyah Sanitarium the writer has studied the subject for several years, applying the test on admission and at intervals during treatment with specific remedies. Observations in 300 tuberculous cases completed show the following results:

On admission the test was negative in					20	cases
Agglutination occurred in dilution				1 : 5 in	49	"
"	"	"	"	1 : 10 "	86	"
"	"	"	"	1 : 15 "	21	"
"	"	"	"	1 : 20 "	50	"
"	"	"	"	1 : 25 "	57	"
"	"	"	"	1 : 30 "	7	"
"	"	"	"	1 : 40 "	4	"
"	"	"	"	1 : 50 "	6	"

In the same cases on discharge the results were as follows: In 288 cases an increase of agglutinating power was observed under treatment with watery extract of tubercle bacilli.

The serum of 63 agglutinated in dilutions of over 1 : 25 and not exceeding 1 : 100. Of these were apparently cured 6, or 9.35 per cent.; the disease was arrested in 22, or 34.92 per cent.; improved in 27, or 42.85 per cent.; stationary in 6, or 9.35 per cent.; and grew worse in 2, or 7.4 per cent.

The serum of 107 agglutinated in dilutions of over 1 : 100 and not exceeding 1 : 200. Of these were apparently cured 41, or 38.32 per cent.; the disease was arrested in 51, or 47.66 per cent.; improved in 14, or 13.08 per cent.; stationary in 1, or 0.94 per cent.; grew worse in none.

The serum of 90 agglutinated in dilutions of over 1 : 200 and not exceeding 1 : 300. Of these were apparently cured 73, or 81.11 per cent.; the disease was arrested in 15, or 16.76 per cent.; improved in 2, or 2.22 per cent.; stationary in none; grew worse in none.

The serum of 28 agglutinated in dilutions of over 1 : 300 and not exceeding 1 : 500. Of these were apparently cured 25, or 85.7 per cent.; the disease was arrested in the remaining 3, or 14.3 per cent.

In the 12 additional cases a decline in agglutinating power was noted in 8 and a total loss in 4; all these 12 patients grew worse or died.

In 20 of our cases in which the diagnosis could be otherwise established no agglutinating power was present, while in 49 it did not exceed a dilution of 1 to 5. Again, in far advanced progressive cases the reaction either disappeared entirely or became progressively diminished.

Arloing and Courmont, subsequently to their earlier publications, decided that agglutination in dilutions below 1 : 5 should not be accepted as diagnostic, since the reaction was often present in healthy persons in such slight degree. My own experience would confirm me in the opinion that in the absence of other definite evidence upon which to base a diagnosis we should require a positive reaction in dilutions of not less than 1 : 10, this because I have frequently observed reaction in lower dilutions in persons in whom a suspicion of tuberculosis did not exist. With this qualification of the 300 cases examined, 231, or 77 per cent., agglutinated in dilutions of 1 : 10 or higher, and in all of these the diagnosis was either sufficiently evident or could be determined by other means. In cases in which there is no sputum or in which tubercle bacilli are absent, and in which the subjective symptoms and physical signs denote apex infiltration or catarrh, I have learned to depend upon the reaction when present in the higher dilutions as of positive determining value, and in such cases the tuberculin test may be dispensed with, its results in my experience always having confirmed those of the serum test.

The occurrence of agglutination in slight degrees, in health, does not detract from the value of the method in clinical practice. The facts that the reaction is frequently absent in the early period of the disease, that it is rarely missed when the disease is more developed, and is again diminished or lost toward the end, show that agglutinins form in the course of tuberculosis, as in other infectious diseases in response to the absorption into the blood of specific toxins. The amount of agglutinins present varies materially with the amount of specific toxins absorbed and the corresponding degree of response on the part of the organism. Hence it is that in the more developed disease we find the reaction most constantly present when the general condition and general resistance are still good. When these are greatly diminished in rapidly progressing cases, the ability to respond is likewise lessened and the agglutinating power in consequence declines or is entirely lost.

The occurrence of the reaction in many healthy persons and in those affected with other diseases may be interpreted by assuming that latent foci exist in those who show slight degrees of agglutinating power, and in consequence of which they have acquired it.

The fact that the sera of new-born children are practically always negative, associated with the extreme rarity of congenital tuberculosis, on the one hand, and, on the other, the great frequency with which latent and healed tuberculous foci are revealed at autopsy of the clinically non-tuberculous, renders more than probable the truth of such an explanation.

The greater comparative frequency with which the reaction occurs in cases of typhoid fever appears to bear an analogy to the recorded experiences with the tuberculin test in such patients.

Thus in a total of 70 typhoid cases in which tuberculin was instilled into the conjunctival sac by various observers, positive reactions occurred in 20, or 28.37 per cent., as detailed below.

TUBERCULIN TEST IN TYPHOID FEVER.

Author.	Cases.	Pos.	Neg.	Preparation.	Remarks.
Stadelmann, E., and Wolff-Eisner[94]	8	0	8	..	All had also given a negative cutaneous test.
Blum, L.[95].....	18	4	14	..	Nine had fever, with 1 react. Nine afebrile, 3 reacting.
Clark, C. P.[96].....	14	7	7	Old tuberculin. 0.5 and 1%.	All febrile cases.
Cohn, Sigism.[97].....	11	6	5	1% old tuberculin.	One of the 6 pos. cases was paratyphoid; 4 afebrile.
Levy, Fritz [98].....	3	1	2	Old tuberculin. Hoechst.	Convalescent.
Tice, F.[99].....	7	1	6	Tablet form.	..
Bourget [100].....	1	1	0	..	..
Austin and Grünbaum[101]	8	0	8	..	..
	70	20	50	..	..
	28.37%.				

Again, according to Arloing and Courmont[102] typhoid patients show agglutinating power for the tubercle bacillus in 75 per cent. of cases.

From this Calmette and Guérin[103] infer that Eberth's bacillus forms agglutinins which are capable of agglutinating both kinds of bacilli, but Arloing and Courmont claim that this occurrence is not due to the identity of the two agglutinins, nor to a parallel method of production. The serum of an animal, they say, may acquire a high agglutinating power for the Eberth bacillus, after inoculation with this bacillus, without exhibiting the like characteristic for Koch's bacillus.

This question is an interesting one, and engaged the writer's attention some ten years ago in a comparative study of the agglutinating power of

the blood-sera of normal individuals and of tuberculous patients in relation to the Eberth bacillus.[104]

In my own experiments I used for control serum from typical cases of typhoid which was found to completely agglutinate the Eberth bacillus in dilutions of 1 : 10 in fifteen minutes. The sera of normal persons who had never had typhoid fever, and also were free from all suspicion of tuberculosis, showed no tendency to agglutinate the Eberth bacillus even after an hour. As compared with the normal and with the typhoid sera, the sera of tuberculous patients, with no history of typhoid fever, showed beginning agglutination of Eberth's bacillus in fifteen minutes and well-marked agglutination in thirty minutes, in the same dilution.

The only explanation for these observations, and one which may be applied with as much reason to account for tuberculin reactions in typhoid patients in greater frequency than these occur in healthy persons, would appear to lie in that of group reactions, even though the Eberth bacillus seemingly presents nothing in common with the acid-proof bacteria. However, no definite conclusions are warranted.

In the preceding consideration of specific aids in the diagnosis and prognosis of tuberculosis, I have endeavored to show the comparative value of the various resources at hand.

The specific nature and value of tuberculin as a diagnostic agent does not appear to be refuted by the objections which have been raised against it. The mimimal amounts in which it is active, the negative results obtained by all three methods of applying it in the new-born, the increasing comparative frequency of positive reactions with advancing age in their approximate harmony with autopsy findings in the clinically non-tuberculous, as well as the tuberculous, the occurrence of focal reactions following subcutaneous injection and conjunctival instillation—all testify to its reliability.

To demand that either positive or negative results be confirmed with mathematical accuracy by actual autopsy findings would be unreasonable. Nor has clinical medicine progressed to such a degree of precision in other respects.

As much may be said for the serum reactions; and as for the various contradictions which have apparently arisen with regard to all the diagnostic measures which have been considered and which are at present not explained, these are problems which may yet be solved in the future.

In clinical practice the occasion can seldom arise to enter so deeply into such questions. Persons who are in good health do not often consult a physician, nor would any but the least conservative base a diagnosis upon a single isolated bit of evidence.

In non-bacillary cases suspected of tuberculosis, when physical examination reveals abnormal conditions suggestive of the presence of a tuberculous affection, the tuberculin tests as well as the serum reactions, or both, may

safely be depended upon for confirmation in the vast majority of instances. One may be employed to supplement the other, and thus, taking all things into consideration, the patient is not liable to be placed at a disadvantage for want of a diagnosis.

BIBLIOGRAPHY.

1. Wolff-Eisner: Berlin. med. Gesellsch., 15 Mai, 1907, ibid., p. 700.
2. Calmette, A.: Acad. d. Sciences, 17 juin, 1907. Cf. Presse médicale, 1907, 19 juin et 13 juillet. Cf. Centrlbl. f. Chir., v. 34, 1907, p. 1031.
3. v. Pirquet, C.: Berlin. med. Gesellsch., 8 Mai, 1907. Cf. Berl. klin. Wchnschr., v. 44, 1907, pp. 644 and 700.
4. Cohn, Sigism.: Berl. klin. Wchnschr., v. 44, 1907, p. 1507.
5. Levy, Fritz: Deut. med. Wchnschr., v. 34, 1908, p. 94.
6. Klieneberger, C.: Münch. med. Wchnschr., v. 54, 1907, p. 2588.
7. Schenck und Seiffert: Münch. med. Wchnschr., v. 54, 1907, p. 2269.
8. Rosenau and Anderson: Journ. A. M. A., v. 50, 1908, p. 961.
9. Roepke: Beitr. z. Klin. d. Tub., v. 9, 1908, p. 353.
10. Smithies and Walker: Journ. A. M. A., v. 50, 1908, p. 259.
11. Mitulescu, J.: Wien. klin. Wchnschr., v. 21, 1908, p. 727.
12. Schultz-Zehden: Therapeut. Monatsh., v. 22, 1908, p. 177.
13. King, H. M.: Medical Record, v. 72, 1907, p. 976.
14. Citron, J.: Deut. med. Wchnschr., v. 34, 1908, p. 316.
15. Lenhartz: Münch. med. Wchnschr., v. 54, 1907, p. 2404.
16. Damask, M.: Wien. klin. Wchnschr., v. 21, 1908, p. 121.
17. v. Ruck, K. and S.: A Clinical Study of 261 cases of Pulmonary Tuberculosis, Asheville, 1905, p. 17.
18. Heron: Trans. Brit. Congr. of Tuberc., London, vol. 3, 1902, p. 84.
19. Bandelier: Deut. med. Wchnschr., v. 28, 1902, p. 357.
20. Holdheim: Berl. klin. Wchnschr., v. 41, 1904, p. 1040.
21. Mitulescu: Deut. med. Wchnschr., v. 29, 1903, p. 367.
22. Klieneberger: Deut. med. Wchnschr., v. 34, 1908, p. 777.
23. Schröder und Kaufmann: Münch. med. Wchnschr., v. 55, 1908, p. 62.
24. Roepke, O.: Loc. cit., No. 9.
25. Stadelmann und Wolff-Eisner: Deut. med. Wchnschr., v. 34, 1908, p. 227.
26. Damask: Loc. cit., No. 16.
27. Heinemann: Münch. med. Wchnschr., v. 55, 1908, p. 556.
28. Levy, Fritz: Loc. cit., No. 5.
29. Dètrè, Lad: Wien. klin. Wchnschr., v. 21, 1908, p. 173.
30. Moro, E.: Münch. med. Wchnschr., v. 55, 1908, p. 216.
31. Lignières: Recueil d. méd. vétér., etc., v. 84, 1907, p. 514. Cf. Centrlbl. f. Bakt., etc., Ref., v. 41, 1908, p. 81.
32. Schreiber: Klin. Jahrb. Etgänzgsbd., Berlin, 1891, p. 657.
33. Binswanger: Arch. f. Kinderhlk., v. 43, 1906, p. 121.
34. Ausset: Revue de Médecine, v. 28, 1908, p. 359.
35. v. Pirquet, C.: Wien. med. Presse, v. 48, 1907, p. 155.
36. Petruschky: Tuberculosis, v. 7, 1908, p. 155.
37. Engel und Bauer: Berl. klin. Wochnschr., v. 44, 1907, p. 1169.
38. Wolff-Eisner: Beitr. z. Klin. d. Tuberk., v. 9, 1908, p. 49.
39. Morelli, G.: Wien. klin. Wchnschr., v. 21, 1908, p. 83.
40. Blum und Schlippe: Münch. med. Wchnschr., v. 55, 1908, p. 60.
41. Damask: Loc. cit., No. 16.
42. Massary et Weil: Bull. d. l. Soc. méd. d. Hôp., 1907, nov. Cited by Blum und Schlippe: Loc. cit., No. 40.
43. Comby: Soc. méd. d. Hôp., 1907, 19 juillet. Cf. Dembinski: Ztschr. f. Tuberk., v. 12, 1908, p. 138.
44. Bourget: Rev. méd. d. l. Suisse romande, 1907, p. 88. Cited by Blum und Schlippe; Loc. cit., No. 40.
45. Raviart, G.: Comptes Rendus, Soc. d. Biol., v. 63, 1907, p. 506.
46. Hirschler, A.: Wien. med. Presse, v. 48, 1907, p. 1765.
47. Levy, Fritz: Loc. cit., No. 5.
48. Marie et Bourilhet: C. R. Soc. d. Biol., v. 63, 1907, p. 281.

49. Fehsenfeld, G.: Münch. med. Wchnschr., v. 55, 1908, p. 1373.
50. Goerlich: Münch. med. Wchnschr., v. 55, 1908, p. 1379.
51. Aronade: Mediz. Klinik, v. 3, 1907, No. 51. Cited by Wolff-Eisner: Loc. cit., No. 38.
52. Massini: Correspblatt. f. Schweiz. Aerzte, v. 38, 1908, p. 359.
53. Engel und Bauer: Loc. cit., No. 37.
54. Regli: Correspbl. f. Schweiz. Aertze, v. 38, 1908, p. 361.
55. Lemaire: Rev. d. l. Tuberculose, 2e sér., v. 5, 1908, p. 199.
56. Gruener, O.: Wien. klin. Wchnschr., v. 21, 1908, p. 986.
57. v. Pirquet: Cf. Loc. cit., No. 1, pag. 699; also: Kutane und konjunktivale Tuberkulinreaktion, in Krause und Levadity, Immunitaetsfrschg., Jena, vol. 1, 1908, p. 1035, p. 1042; also: Wien. klin. Wchnschr., v. 20, 1907, p. 1123.
58. Ziesché, H.: Berl. klin. Wchnschr., v. 45, 1908, p. 1168.
59. Mettetal, Fréd.: Valeur de la tuberculine dans le diagnostic de la tuberculose de la premiere enfance, Thèse d. Paris, 1900.
60. France, Er.: Trans. Brit. Congr. of Tuberc., London, v. 3, 1902, p. 106.
61. Mikulicz: Deut. med. Wchnschr., v. 17, 1891, p. 373.
62. Diehl: Casuistischer Beitrag zur Kenntnis des Tuberkulins als Diagnosticum, Diss. Freiourg, i, B, 1892.
63. Matthes, M.: Deut. Arch. f. klin. Med., v. 54, 1894, p. 39.
64. Freymuth, W.: Ueber die Wirkung, von subcutanen Peptoninjectionen. Diss. Erlangen, 1898.
65. Cabot, R.: Journ. Boston Soc. Méd. Sci., Jan., 1899.
66. Neisser: Klin. Jahrb. Ergänzgsbd., Berlin, 1891, p. 418.
67. Maragliano: Riforma medica, 1891. Cf. Münch. med. Wchnschr., v. 38, 1891, p. 149.
68. Schwalbe, J.: Berliner klinik, Jan., 1891, No. 31.
69. Feistmantel, L.: Centrlbl. f. Bakt., etc., Orig., v. 36, 1904, p. 282.
70. Klemperer: Ztschr. f. klin. Med., v. 20, 1892, p. 165.
71. Irimescu, S.: Rivist. Stiintel. med., 1907, Nos. 7 and 8. Cf. Centrlbl. f. Inn. Med., v. 29, 1908, p. 87.
72. Arloing, Fern.: C. R. Soc. d. Biol., v. 64, 1908, p. 722.
73. Calmette et Guérin: C. R. Soc. d. Biol., v. 64, 1908, p. 889.
74. Entz, R.: Wien. klin. Wchnschr., v. 21, 1908, p. 379.
75. v. Pirquet: Wien. klin. Wchnschr., v. 21, 1908, p. 623.
76. Roepke: Loc. cit., No. 9.
77. Roe, A. D.: Brit. Med. Journ., v. 1, 1908, p. 443.
78. Eisenberg und Keller: Centrlbl. f. Bakt., etc., Orig., v. 33, 1903, p. 549.
79. Dieudonné: Deut Militärärztl. Ztschr., 1900, No. 10.
80. Beck und Rabinowitsch: Trans. Brit. Congr. of Tuberc., London, v. 3, 1902, p. 153.
81. v. Gebhard und v. Torday: Münch. med. Wchnschr., v. 49, 1902, p. 1171.
82. Grazia: Berl. klin. Wchnschr., v. 39, 1902, p. 229.
83. Wright and Douglas: Lancet, v. 2, 1904, p. 1138.
84. Ferré: Ann. d. Méd. et Chir. Infant., v. 10, 1906, p. 648.
85. Kinghorn: Medical News, v. 87, 1905, p. 647.
86. Bendix: Deut. med. Wchnschr., v. 26, 1900, p. 224.
87. Rumpf und Guinard: Deut. med. Wchnschr., v. 28, 1902, p. 131.
88. Carrière. G.; C. R. Soc. d. Biol,. v. 53, 1901, p. 746.
89. Berthelon: Paris Congr. of Tuberc., v. 1, 1906, p. 359.
90. Hawthorn: Gaz. Hebd. d. Méd. et Chir., n. s., v. 7, 1902, p. 547.
91. Romberg: Münch. med. Wchnschr., v. 49, 1902, p. 89.
92. Descos: Journ. d. physiol. et d. pathol. gén., v. 5, 1903, p. 127.
93. Rosenberger: Centrlbl. f. Inn. Med., v. 25, 1904, p. 665.
94. Stadelmann und Wolff-Eisner: Loc. cit., No. 25.
95. Blum und Schlippe: Loc. cit., No. 40.
96. Clark, C. P.: Journ. A. M. A., v. 50, 1908, p. 2061.
97. Cohn, Sigism.: Loc. cit., No. 4.
98. Levy, Fritz: Loc. cit., No. 5.
99. Tice, Fred.: Journ A. M. A., v. 50, 1908, p. 1982.
100. Bourget: Loc. cit., No. 44.
101. Austin and Gruenbaum: Brit. Med. Journ., v. 2, 1907, p. 1907.
102. Arloing et Courmont: Paris Congr. of Tuberc., v. 1, 1906, p. 332.
103. Calmette et Guérin: Loc. cit., No. 73.
104. v. Ruck, S.: Journ. of Tuberculosis, v. 1, 1899, p. 1179.

THE COAGULABILITY OF THE BLOOD IN PULMONARY TUBERCULOSIS,

(A PRELIMINARY INVESTIGATION.)

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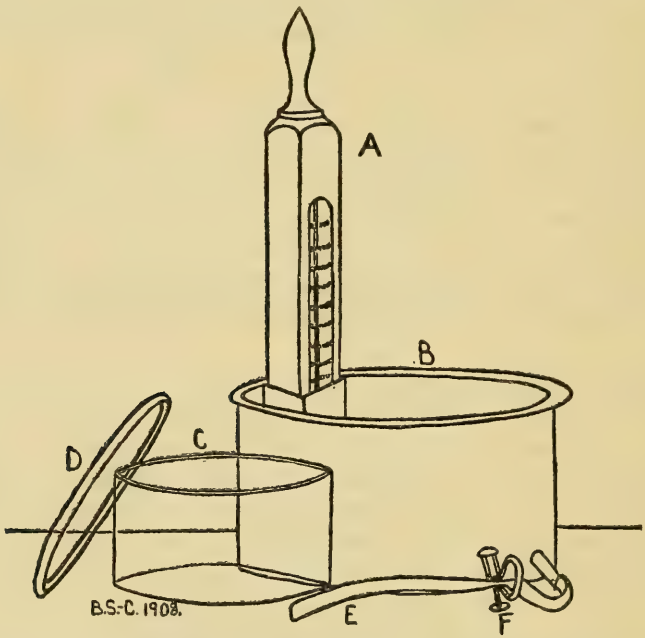
With all the attention that has been devoted in recent years to the study of tuberculosis it seems strange that no attempt has been made to investigate the coagulability of the blood in this disease. I have been able to find but two references to such a test having been made. Vierordt[1] in 1878 obtained with his method an average clotting-time of four minutes in two cases of phthisis. Several years ago, using Wright's tubes, I[2] found the average time of four cases of pulmonary tuberculosis to be two minutes and a quarter.

It is undoubtedly of interest to know whether the coagulability of the blood in pulmonary tuberculosis differs from the normal, and, if so, whether it is the same in incipient, moderately advanced, and far advanced cases. Such a study might have an important bearing upon the cause and treatment of a complicating hemorrhage, especially in view of Wright's[3] assertion that hemorrhage from the bowel and nose in typhoid fever, and often hemoptysis, is associated with a serious defect of blood coagulability, and in view of the relationship between hemoptysis and hemophilia pointed out by Thompson,[10] who believes that pulmonary hemorrhage is often the result of an inherited hemorrhagic tendency. The lack of definite knowledge on this point is surprising when one contemplates the almost universal use of calcium salts in pulmonary hemorrhage. Many important questions arise in this connection. Is the clotting-time different in cases that are spitting blood than in those that are not, and in patients who are subject to hemorrhage than in those who have never experienced it? Does it vary with the degree or duration of the bleeding, and does it change as the hemorrhage continues? It was in an endeavor to answer these and other questions that the present investigation was undertaken.

The blood was tested according to the method devised by the writer,[4] which is a modification of Milian's method, but provides against evaporation and changes in temperature. The rim of a German Stender-dish is smeared

with lanolin, the lid is fastened on with a rubber band, and the inverted dish is placed in a pan of water whose temperature is maintained at 37° C. (98° F.) by the addition of hot and cold water. The dish is taken from the water, quickly dried and removed from the lid. On the inverted lid are deposited several drops of blood obtained without undue pressure from a deep puncture made with a sharp lance-pointed instrument, the first drop having been removed and the finger being wiped off after each drop is taken. The dish is again laid upon the lid and held in place by the rubber band. With a millimeter scale held under the inverted dish the diameter of each



A, ordinary bath thermometer; *B*, zinc pan (common tin pan will answer); *C*, German Stender-dish; *D*, lid of German Stender-dish; *E*, rubber tube; *F*, clamp.

drop is measured, after which the dish is again placed in the water-bath with the lid underneath. At intervals the dish is removed from the pan and tilted, while the drops are inspected both from the side and from the front. On profile view the drop sags, becoming tear- or pear-shaped, before it is clotted; when coagulation is complete, it does not change its shape on moving the dish, but remains convex in outline. Holding the dish vertically and looking at it in front, the drop will be seen to be denser below and clearer above when not coagulated, but darker in the middle or of an even density after clotting has occurred. Note is taken of the size of each drop, the moment it appears on the finger, and the time it is completely coagulated.

The interval between the two records is taken as the clotting-time. Drops with a diameter under 5 cm. or over 7 cm. are usually disregarded. The average time of the drops used is considered the average clotting-time.

The advantages of this method over others are that: (1) the contact surface is limited in extent, clean and uniform in character; (2) there is practically no evaporation; (3) the temperature is definite and constant; (4) the size of the drops is uniform; (5) the personal equation is largely eliminated; (6) the method is simple and easily available; (7) the results are fairly constant.

Comparative work on the coagulability of the blood is rendered difficult on account of the variations of the clotting-times obtained with the different instruments. The average normal time with the method just described is $8\frac{2}{3}$ minutes, with the Brodie-Russell instrument and its modifications about $5\frac{1}{2}$ minutes, with Wright's tubes $2\frac{1}{2}$ and 5 minutes, with Vierordt's method $9\frac{1}{2}$ minutes, with Buckmaster's $5\frac{3}{4}$ minutes, with Biffi's $8\frac{1}{2}$ minutes, with Bezançon and Labbi's modification of Milian's method 10 minutes, and with Hinman and Sladen's modification about $6\frac{1}{2}$ minutes. Where two limits are given by writers, I have taken the mean. In different hands, and sometimes in the same hands, the same apparatus often gives different results.

This variation is due not only to faults of technic affecting the blood after it has left the vessels, but also to other factors influencing the coagulability of the blood while still in its regular channels. As the writer has shown,[5] the latter include meteorological conditions, such as barometric pressure and humidity, viscosity, hemorrhage, meal-time, certain diseased conditions, such as jaundice, typhoid fever, and urticaria, and certain drugs, such as the salts of calcium and the citrates, alcohol, and blood-serum. There are doubtless other sources of error which are still unrecognized.

In order to compare records taken with different instruments I have suggested[5] the following schemes. A pathological clotting-time obtained with any apparatus may be expressed as a fraction, the numerator of which is the pathological time and the denominator the normal time as given by the same method. This fraction may be expressed as a decimal or in terms of percentage. A pathological record obtained with one instrument may also be expressed in terms of another method by means of proportion, the fraction just described being made to equal a fraction whose numerator is x and whose denominator is the average normal clotting-time of the method in terms of which it is desired to express the figures.

The patients examined were in the writer's wards at the Home for Consumptives, Chestnut Hill, and in his tuberculosis class at the Medical Dispensary of the Hospital of the University of Pennsylvania, in the tuberculosis wards of Drs. Albert P. Francine, Howard S. Anders, Ward Brinton, and H. R. M. Landis at the Philadelphia General Hospital, in Drs. Solomon

Solis-Cohen's and T. Mellor Tyson's wards at the Rush Hospital for Consumption and Allied Diseases, Philadelphia, and from the tuberculosis wards of Dr. Geo. F. Fetterman at the Jewish Hospital, Philadelphia. I desire here to express my thanks to these men for their courtesy in granting me the privileges of their wards.

One hundred cases were examined, 134 tests being made on them.

The average coagulation-time of the 100 cases was $5\frac{1}{6}$ minutes, which may also be expressed as $\frac{3}{5}$ or 60 per cent. of the normal, and was practically the same in incipient, moderately advanced, and far-advanced cases, as classified by the National Association for the Study and Prevention of Tuberculosis. In afebrile cases, moreover, the time differed very little from that in cases with high fever or with moderate rise of temperature. It would, therefore, seem that blood coagulability is increased in pulmonary tuberculosis. The clotting-time seemed to be slightly affected by some meteorological conditions, although this might have been due to accidental causes.

The outdoor temperature cannot be said to have exerted any influence. On days when the temperature was above 75° F. the clotting-time was $\frac{2}{5}$ of a minute longer than on days when the thermometer registered 75° F. or less; but, on the other hand, it was very slightly shorter on days when the mercury went up to 80° and above than on days when it failed to reach this point. The time, moreover, was but $\frac{1}{7}$ of a minute longer in cases examined in very hot weather than in those tested on cooler days.

Barometric pressure did not seem to be a factor in these cases, although in 42 tests made on non-tuberculous patients[5] the clotting-time was longer on days when the barometric pressure was high.

The coagulation-time, however, did seem to be affected by the humidity, averaging $5\frac{1}{2}$ minutes on days when the humidity was 70 and above and $4\frac{7}{8}$ minutes on days when the humidity was below 70. This is likewise at variance with my records in non-tuberculous cases.[5]

Sunshine seemed to exert some influence. On days favored with more than eleven hours of sunshine the clotting-time averaged but $4\frac{9}{10}$ minutes, while on days with eleven hours of sunshine or less the average time was $5\frac{5}{9}$ minutes.

The cases of pulmonary hemorrhage are too few in number to permit the drawing of definite conclusions. It would seem, however, that persons with increased coagulability are less liable to hemorrhage than those whose coagulability is deficient. The clotting-time was $4\frac{5}{7}$ minutes in patients who had never had hemorrhage, $5\frac{5}{9}$ minutes in those who had spit blood within two days, $6\frac{1}{3}$ minutes in persons who had experienced hemoptysis within a week but who were free from it when examined, and $5\frac{3}{5}$ minutes in those who had suffered from hemorrhage at some time, but not within two weeks.

Only three cases were examined both before and during a hemorrhage,

but in them the clotting-time was 7⅛ minutes before the bleeding and 4 minutes while it was in progress. This is in accordance with the general observation that hemorrhage is followed by increased coagulability, as noted by Hinman and Sladen[6] in typhoid fever, and by Robertson, Illman, and Duncan[7] in typhoid fever, abortion, carcinoma of the uterus, and in hemorrhage after venesection.

Vierordt[1] attributes the increased coagulability to absorption of tissue juices into the depleted vessels.

There also seemed to be some relation between the character and course of the hemorrhage and the coagulation time. The bleeding was less severe and diminished more rapidly in cases whose clotting-time was short than in those in whom it was delayed. The clotting-time was 5⅜ minutes in those whose sputum was blood-streaked and 6⅓ minutes in those with slight hemoptysis.

Of the cases that began with severe or slight hemorrhage those that only exhibited blood-streaked sputum when examined had a clotting-time of 5¼ minutes, while those that still were spitting blood in larger quantity had an average time of 6½ minutes.

The small number of hemorrhage cases is due to the fact that the tests were made chiefly during July and August, blood-spitting being noticeably infrequent in the summer, a circumstance that some of my colleagues have also observed. In two of the hospitals from which I obtained my cases hemoptysis did not occur for a space of eight weeks. A large hospital that never contained less than 200 consumptives, and often experienced three and four deaths a day, had only a few cases of moderate blood-spitting a week, and severe hemorrhage was quite rare.

Thompson,[10] on the other hand, holds that the season at which hemoptysis is most rife is during the summer heat, and has drawn up a table of 1000 cases in which the date of the blood-spitting was accurately known, that shows the very large preponderance of cases occurring during the summer months. Anders[8] also found that spring and summer show the highest incidence in hemoptysis, but in a recent personal communication he states that a more comprehensive study proves the reverse to be true.

In order, however, to obtain information of practical value many series of observations on patients with hemorrhage will be required. This will necessitate daily tests made before, during, and after a hemorrhage over long periods of time and in large numbers of cases, regard being had to the season and the temperature. These, of course, can best be undertaken by those residing in tuberculosis hospitals or sanatoriums. From the knowledge thus gained it may be possible by examining the blood to tell whether a patient is likely to have a hemorrhage and so be able to take measures to prevent it.

The coagulability of the blood should also be determined separately in patients who have, and in those who have not been taking calcium salts. Calcium salts should be administered to one set of cases with delayed coagulability, but who are not spitting blood and their subsequent clotting-time compared to that of another set who are given the drug. In like manner comparison should be made of the clotting-time of patients with hemorrhage who are taking calcium and of those who are not. In this way definite information will be gained as to the action of this drug in preventing or checking pulmonary hemorrhage.

It is not uncommon for female consumptives to spit blood at the menstrual period. The clotting-time in the few cases I examined was practically the same in all instances of hemoptysis in women, whether or not they were menstruating or were at the menstrual period. There can be little doubt that hemoptysis in women is often a vicarious menstruation. The possibility of such an occurrence should naturally have an important bearing at times upon prognosis and treatment. A comparative study of the clotting-time of healthy and tuberculous women both during and between their menstrual periods could not fail to prove of value.

Wright[9] applies the term "serous hemorrhage" to increased transudation of plasma through the capillary wall, as seen in pleural effusion, serous diarrhea, etc., and suggests the existence in these cases of a connection with deficient coagulability. As pleural effusion and serous diarrhea both occur as complications in tuberculosis I included them in this investigation. In one case of pleural effusion the clotting-time was over $10\frac{1}{8}$ minutes, in one case of hydropneumothorax $4\frac{1}{2}$ minutes, in one case of empyema $3\frac{1}{2}$ minutes, and in one case of pyopneumothorax $3\frac{3}{8}$ minutes. The cases are too few to admit of any conclusions. It would seem, however, that coagulability is diminished in simple effusion, but increased when pus is present in the pleura.

Eleven of the patients who had diarrhea gave an average clotting-time of $5\frac{1}{2}$ minutes, not much longer than that of cases without diarrhea. No questions were asked, however, as to the character of the diarrhea. But even if regarded as a "serous hemorrhage," the question suggests itself: Would not the loss of fluid in a serous diarrhea have a tendency to increase the viscosity of the blood and at the same time its coagulability?

No one realizes more than the writer the inconclusive character of this investigation, due to the paucity of cases. Enough, nevertheless, has been shown to demonstrate that the coagulability of the blood in pulmonary tuberculosis offers a large field for study, with some probability of obtaining information of practical value. It is to be hoped that those who have the facilities will undertake the lines of inquiry suggested. With the Stenderdish method the worker will at least have the satisfaction of knowing that the results of his labors will not be vitiated by faults of technic.

Below are given the figures in detail, including the maximum and minimum as well as the average clotting-times obtained and the number of cases and tests on which each record is based.

THE CLOTTING-TIME IN PULMONARY TUBERCULOSIS AND IN ITS VARIOUS STAGES.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Longest.	Shortest.
All stages	100	134	5 1/6	10 3/8	2 1/8
Incipient	26	32	5 1/7	8 1/2	2 1/8
Moderately advanced	27	32	5 1/7	8 1/2	2 1/2
Far advanced	47	70	5 1/5	10 3/8	2 5/8

CASES DIVIDED ACCORDING TO THEIR TEMPERATURES.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Longest.	Shortest.
Afebrile	5	5	5 1/4	7 1/2	2 1/8
98.7° to 100°	36	48	5 1/3	10 3/8	2 1/2
Above 100°	36	49	5	9 1/8	3
Temp. not recorded	27	32	6	10 3/8	2 1/4

CASES DIVIDED ACCORDING TO THE OUTDOOR TEMPERATURE ON THE DAY THE TEST WAS MADE.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Longest.	Shortest.
80° and above	55	72	5 1/7	10 3/8	2 1/4
Below 80°	45	57	5 1/4	10 3/8	2 1/8
Above 75°	81	99	5 2/5	10 3/8	2 1/4
75° and below	19	28	5	7 7/8	2 1/8

CASES DIVIDED ACCORDING TO THE BAROMETRIC PRESSURE THE DAY THE TEST WAS MADE.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Longest.	Shortest.
30.10° and above	41	52	5 1/5	10 3/8	2 1/8
Below 30.10°	56	74	5 1/5	10 3/8	2 1/4

CASES DIVIDED ACCORDING TO THE HUMIDITY ON THE DAY THE TEST WAS MADE.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Longest.	Shortest.
70° and above	55	71	5½	10⅜	2¼
Below 70°	41	55	4⅞	10⅜	2⅛

CASES DIVIDED ACCORDING TO THE HOURS OF SUNSHINE THE DAY THE TEST WAS MADE.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Longest.	Shortest.
11 hours or less	45	52	5 5/9	10⅜	2⅛
More than 11 hours	52	72	4 9/10	7¾	2¼

THE CLOTTING-TIME IN PATIENTS WHO HAVE SPIT BLOOD WITHIN TWO DAYS; AND DIVIDED ACCORDING TO THE SEVERITY OF THE HEMORRHAGE.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Longest.	Shortest.
All hemoptysis	27	34	5⅝	8½	2¼
Severe hemorrhage	6	7	5⅓	7⅝	2¼
Slight hemorrhage	6	7	6⅓	8½	2⅞
Streaks of blood	15	20	5⅜	7¾	3⅝

HEMORRHAGE WITHIN TWO DAYS CASES DIVIDED ACCORDING TO THE DAY OF THE HEMORRHAGE ON WHICH THE TEST WAS MADE.

Classification.	Day of Hemorrhage.	Number of:		Clotting-time in Minutes.		
		Cases.	Tests.	Average.	Longest.	Shortest.
Severe and light	1st.	6	7	6	8½	3⅜
" " "	2d.	2	2	6⅛	7⅜	4⅞
" " "	3d.	13	1	2¼	2¼	2¼
" " "	4th.	0	..	..	..	..
" " "	5th and after.	4	5	5⅝	8	3⅜
Streaked	1st.	3	5	6	7¾	3⅞
"	2d.	5	5	5½	7⅜	4
"	3d.	2	2	5¾	6	5½
"	4th.	1	2	3⅝	3⅝	3⅜
"	5th and after.	3	4	5¾	7⅜	4¼

HEMORRHAGES THAT WERE SEVERE OR SLIGHT AT FIRST; DIVIDED ACCORDING TO WHETHER THEY WERE THE SAME WHEN THE TEST WAS MADE OR WHETHER THEY HAD DIMINISHED TO STREAKS.

Condition at Time of Test.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Longest.	Shortest.
Severe or slight	4	7	6½	8	3⅜
Streaked sputum	6	6	5¼	7⅜	2½

RECORDS ON THE SAME PATIENT TAKEN BEFORE AND DURING A HEMORRHAGE.

Day before Hemorrhage.	Clotting-time.	Day of Hemorrhage.	Clotting-time.
5	7½	5	5¾
38	7½	3	2¼
36	6½	½	3⅞

HEMORRHAGE WITHIN SEVEN DAYS OF TEST BUT WHICH HAD CEASED WHEN TEST WAS MADE.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Highest.	Lowest.
All kinds	6	8	6⅓	10⅜	3⅝
Severe	2	3	5¾	7⅛	4½
Slight	3	3	7½	10⅜	5¼
Streaked	1	2	3⅝	3⅝	3⅝

NO HEMORRHAGE WITHIN TWO WEEKS, DIVIDED INTO THOSE WHO HAVE NEVER HAD HEMORRHAGE AND THOSE WHO HAVE HAD.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Highest.	Lowest.
Never had hemorrhage	28	38	4⅝	8⅝	2⅜
Had hemorrhage	34	40	5⅗	10¼	3⅛

CASES OF DIARRHEA.

Number of:		Clotting-time in Minutes.		
Cases.	Tests.	Average.	Highest.	Lowest.
11	13	5½	10⅛	3¾

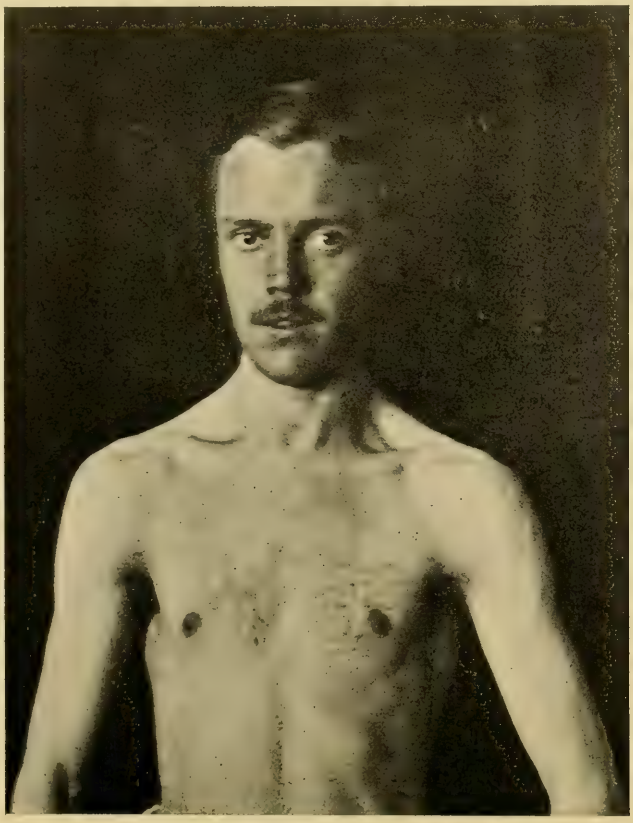
HEMORRHAGES IN WOMEN IN RELATION TO THE MENSTRUAL PERIOD.

Classification.	Number of:		Clotting-time in Minutes.		
	Cases.	Tests.	Average.	Highest.	Lowest.
Menstruating	4	5	$5\frac{3}{4}$	6	$4\frac{7}{8}$
At menstrual period	2	2	$5\frac{3}{4}$	$6\frac{1}{4}$	$5\frac{1}{4}$
Neither of above	10	16	$5\frac{2}{3}$	$10\frac{3}{8}$	$3\frac{3}{8}$

REFERENCES.

1. C. Herman Vierordt: "Die Gerinnungszeit des Blutes in gesunden und kranken Zuständen," Archiv der Heilkunde, 1878, vol. xix, page 193.
2. Myer Solis-Cohen: "A Study of the Coagulability of the Blood in Disease," University of Penna. Medical Bulletin, 1907, vol. xx, page 56.
3. A. E. Wright: "On Some New Procedures for the Examination of the Blood and of Bacterial Cultures," Lancet, 1902, vol. ii, page 11.
4. Myer Solis-Cohen: "A Simple and Accurate Method for Measuring the Clotting-time of the Blood," University of Penna. Medical Bulletin, 1908, vol. xxi, page 203.
5. Myer Solis-Cohen: "Factors Influencing the Coagulation-time of the Blood," read at the Fifty-eighth Annual Session of the Medical Society of Pennsylvania, September, 1908.
6. Frank Hinman and Frank J. Sladen: "Measurement of the Coagulation Time of the Blood, and its Application," Bulletin of the Johns Hopkins Hospital, 1907, vol. xviii, page 207.
7. W. E. Robertson, G. M. Illman, and H. A. Duncan: "Coagulation of the Blood," Journal of the Am. Med. Assoc., 1908, vol. l, page 1583.
8. J. M. Anders: "Hæmoptysis Due to Tuberculosis—A Preliminary Study," Trans. American Climatological Association, 1907, vol. xxiii, page 127.
9. A. E. Wright: "On the Association of Serous Hemorrhages with Conditions of Defective Blood Coagulability," Lancet, 1896, vol. ii, page 807.
10. Reginald E. Thompson: "The Causes and Results of Pulmonary Hemorrhage," London, 1879.

Koincidenz des linkseitigen Clavicularphänomens mit dem ebenfalls linkseitigen Acromialsymptom bei linkseitiger Spitzenerkrankung (I. Stadium der Lungentuberkulose).



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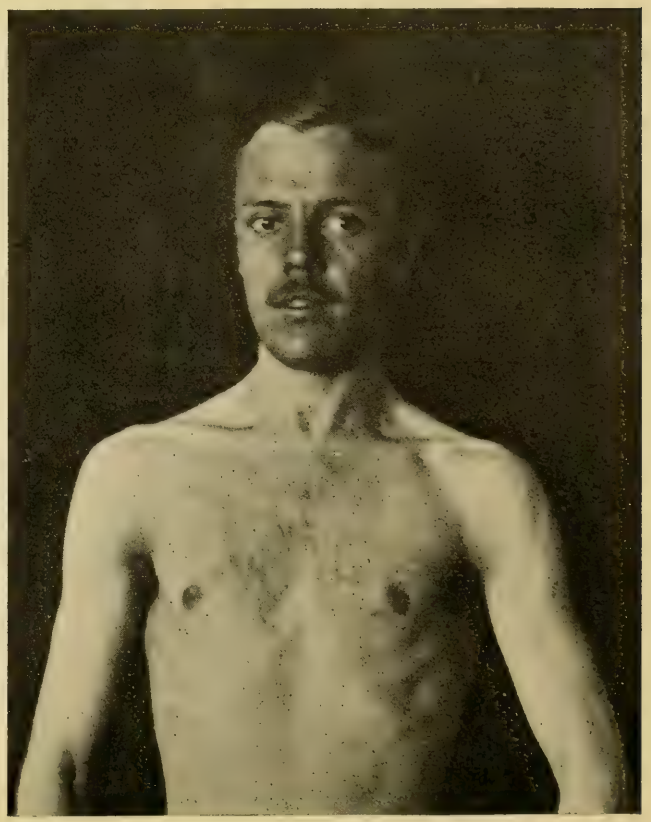


Inspiration.

Bei tiefer Inspiration wird der vorhandene Tiefstand der linken Clavicula durch die relative Immobilität des linken Acromions noch augen-

DAS CLAVICULARPHÄNOMEN UND DAS ACROMIAL-SYMPTOM.

Von Dozent Dr. D. O. Kuthy,
Leiter des Königin Elisabeth-Sanatoriums, Budapest.

Genaue Anamnese und genaueste Inspection sollen auch in unseren Tagen—in dem Zeitalter der komplizirtesten Untersuchungsmethoden—in der Diagnostik der Lungentuberkulose nicht vernachlässigt werden.

Aus dieser Überzeugung ausgehend, wendete ich seit einer gewissen Zeit mehr Aufmerksamkeit dem Ausfragen der Lungenkranken bezüglich den thoracalen Schmerzen zu und fand unter mehr als 650 Patienten, welche an Lungentuberkulose verschiedenen Stadiums gelitten haben, dass der pleurale Schmerz in ca. 60% der Fälle von den Kranken angesagt wird und davon in gute 85% die afficirte oder die stärker afficirte Seite dem Arzte andeutet. Ja sogar ist das Auftreten pleuraler Schmerzempfindungen an neuen Stellen oft das erste Symptom, welches den Arzt auf das Übergreifen des krankhaften Prozesses auf bisher gesunde Lungentheile aufmerksam macht. Theilweise durch directe subpleurale Knötchenbildung (in den subpleuralen Lymphwegen), theilweise durch den fortgeleiteten Entzündungsprozess von nahe der Pleura sich befindlichen Herden ist der Umstand wohl verständlich. Die Seite des veralteten Prozesses in chronischen Fällen schmerzt nicht mehr,—der Kranke gibt auf unsere genaue Fragestellung an, hier Schmerzen gehabt zu haben,—die neuerdings angegriffene Seite zeigt im Gegentheil jetzt die Schmerzempfindung, oder schmerzte erst vor Kurzem.

Die centralen Peribronchitiden und Bronchopneumonien schmerzen aber nicht und man könnte auch sagen, dass es torpide Leute giebt, die den Schmerz nicht gut appercipieren und auch die Selbstbeobachtung, Aufmerksamkeit und das Gedächtniss besonders von weniger intelligenten Leuten nicht ausreicht, um dieses anamnestische oder gegenwärtige, doch jedenfalls subjective Symptom in der Seitenlocalisation der Lungentuberkulose genügend verwerthen zu lassen.

Deshalb suchte ich nach brauchbaren objectiven Symptomen, Inspectionszeichen, welche die Aufmerksamkeit des untersuchenden Arztes auf die afficirte Thoraxhälfte noch vor der Durchführung der Percussion hinleiten könnten. Es führte mich in dieser Richtung auch die Überzeugung, dass besonders in initialen Fällen die minutiöse Exploration durch das Ohr, an

der betreffenden Lungenhälfte jedenfalls genauer geschehen wird, wenn unsere Aufmerksamkeit bereits durch die Inspection auf eine Seite gelenkt würde.

Das Einsinken der Supraclaviculargrube und noch mehr die groben Abflächungen des oberen Theiles der einen Thoraxhälfte, als Zeichen einer pleuropulmonaren Retraction, sind späte Schrumpfungserscheinungen, können also in der Frühdiagnostik nicht verwendet werden.

Ich begann daher zuerst auf die Stellung der Schlüsselbeine zu achten. Schon in der medizinischen Literatur der vergangenen Jahrzehnte findet es Erwähnung, dass die Clavicula der tuberkulös erkrankten Seite oft tiefer stehen soll. Dies ist auch der Fall. Und zwar fand ich unter den ersten 299 hierauf gemusterten Lungentuberkulösen das eine Schlüsselbein tiefer stehend in 82% der Fälle.

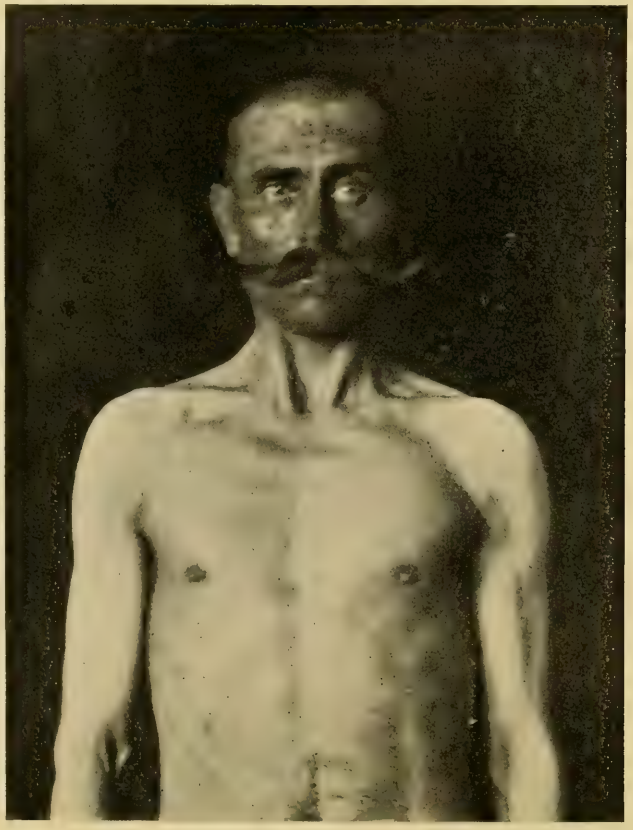
Diesen Tiefstand bei gerader columna vertebralis in vorgeschrittenen oder veralteten Fällen zu finden, ist nicht selten bloss eine Begleiterscheinung des einseitig ausgesprägteren Collapses an dem Brustkorb. Doch bei genauer Inachtnahme entsprechender Fälle stellt es sich heraus, dass das "Clavicularphänomen" auch im ersten Stadium der Krankheit vorkommt, ja sogar das nicht weniger oft auf die erkrankte oder stärker erkrankte Seite hindeutet. Von den 299 Patienten waren 86 in dem ersten Stadium der Lungentuberkulose; von denen zeigten 80% (69 Kranke) ein positives Schlüsselbeinphänomen und heraus haben fast 63% (54 Kranke) den Tiefstand der Clavicula an der (stärker) afficirten Seite des Thorax. Das Fehlen des Clavicularphänomens kam unter den Kranken verschiedenen Stadiums in 18% vor, bei den Kranken I. Stadiums in 20%; das Nichtstimmen des Schlüsselbeinsymptoms mit der (stärker) erkrankten Seite wurde unter sämtliche Kranke in 20½%, unter den Kranken des I. Stadiums sogar und in 17% der Fälle gefunden.

Da aber bei 20% der initialen Fälle das Clavicularsymptom gar nicht vorhanden ist, dasselbe bei beiderseitiger Erkrankung nicht genügend auffällt und in ca. 18–20% der Fälle auch irreführt, so suchte ich um ein weiteres womöglich verlässlicheres Inspectionszeichen am Thorax, welches das eventuell fehlende Clavicularsymptom ersetzen resp. erhärten oder corrigiren könnte. Dieses bot sich in der Beobachtung der Bewegung des Acromions bei tiefer (jedoch nicht angestrengter) Inspiration. Bei diesen Studien stellte es sich heraus, dass die Schulterspitze der erkrankten Seite auch in den frühesten Fällen bereits weniger sich erhebt, ja sogar ganz unbeweglich bleibt. Diese Erscheinung nenne ich "Acromialsymptom."

Allbekannt ist in der Diagnostik das Zurückbleiben der einen Thoraxhälfte, besonders der oberen Partien, bei Einathmung, im Falle von Lungentuberkulose. Die Bewegung von Flächen zu beobachten und zu controlliren ist aber schwieriger als die von Punkten; anderseits beginnt das in ini-

Tafel II.

Antagonismus des rechtseitigen Clavicularphänomens mit dem linkseitigen sehr ausgeprägten Acromialsymptom bei beiderseitiger, doch links mehr vorgeschrittener Erkrankung (II. Stadium der Lungentuberkulose).



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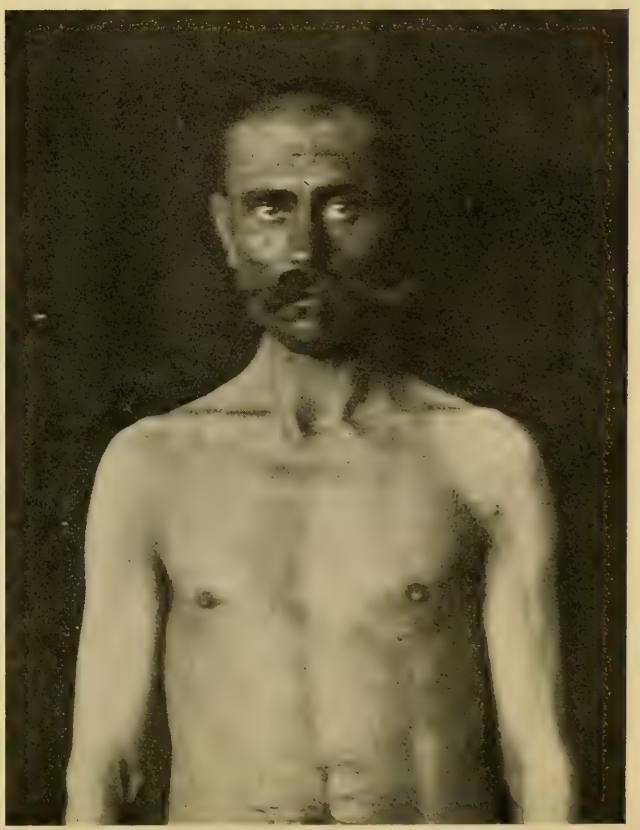

Inspiration.

Bei tiefer Inspiration verschwindet der vorhandene Tiefstand der rechtseitigen Clavicula, im Gegentheil wird durch die Immobilität des linken Acromions ein linkseitiges Tieferstehen des Schlüsselbeins hervorgebracht.

tialen Fällen durch die bereits eintretende Lungenschonung hervorgebrachte und durch den relativen Stillstand der obersten Thoraxhälfte bedingte Acromialsymptom oft, in der Mehrzahl der Fälle, schon in den frühesten Stadien, während die Trägheit der Excursion an den mehr unten liegenden Theilen des Thorax erst bei gröberen Lungenveränderungen, bei sich schon nach abwärts ausbreitenden Prozessen auffallend wird.

Bis wir das Acromialsymptom nicht näher beobachteten, fand es sich von 142 Fällen blos in 60.5% (86 Kranke) vor; bei den letzten 51 derselben Krankengruppe aber, bei denen wir die Bewegung des Acromions in der neuesten Zeit schon mit voller Aufmerksamkeit untersuchten, erhob sich der Procentsatz der Fälle mit positivem Acromialsymptom auf 80.4% (41 Kranke), also auf dieselbe Höhe, welche die Häufigkeit des Clavicularphänomens zeigt.

Und das irrige Deuten des bereits in initialen Fällen eintretenden Symptoms ist ganz selten. Im ganzen fanden sich unter den 86 Fällen nur 2 vor (beide I. Stadiums), wo das Acromialsymptom nicht die Seite der (stärkeren) Erkrankung ankündigte. Unter des I. Stadium (24 positive Fälle) erwiem es sich in 20 Fällen als ein völlig guter Indicator; blos in 2 Fällen zeigte es nicht alles (einseitige Erkrankung bis in der That doppelseitigen Prozess) und in 2 Fällen verfehlte das Symptom die Wahrheit.

Es ist zu bemerken, dass über diesen 24 erste Stadien das Acromialsymptom in 3 Fällen bei unsicherem Clavicularphänomen die richtige Seitenlocalisation ermöglicht, und in 5 Fällen sogar bei ganz irrig zeigendem Schlüsselbeinsymptom. Jedenfalls bin ich geneigt anzunehmen, dass der praktische Arzt beide Inspectionsymptome—auch vereint mit der anamnestischen Angabe der Kranken über Dolor—für richtige Seitenlocalisation der Lungentuberkulose schon in den frühen Stadien der Krankheit als gute diagnostische Behelfe benutzen können wird.

L'AMICALE DE BLIGNY.

ASSOCIATION DES MALADES ET ANCIENS MALADES DU SANATORIUM DE BLIGNY.

PAR L. GUINARD,
Médecin-Directeur des Sanatoriums de Bligny.

Estimant, comme beaucoup d'autres phtisiologues que notre tâche serait très imparfaitement remplie, si, après leur sortie du Sanatorium, nous cessions de nous intéresser à nos anciens malades, j'ai pensé que le meilleur moyen d'assurer, audelà, de la maison de cure, les bienfaits de notre Œuvre, était de maintenir, entre tous les malades présents et anciens, les relations amicales qui s'établissent au Sanatorium; en fondant une association les unissant tous dans un même lien de camaraderie et de mutuelle solidarité.

Ainsi nous avons fondé, comme entre élèves et anciens élèves d'un collège ou d'une école, une Amicale des malades et anciens malades du Sanatorium de Bligny, dont l'existence et le fonctionnement m'ont paru intéressants à faire connaitre.

D'après les termes de ses Statuts, cette Association se propose, avec le concours de l'Œuvre des Sanatoriums Populaires de Paris:

1° d'établir, entre tous ses membres, un centre de relations et d'assistance;

2° de venir en aide aux sociétaires et à leur famille dans le besoin;

3° de mettre des "*Bourses de santé*" temporaires à la disposition des pensionnaires nouvellement sortis;

4° de procurer un emploi, dans la mesure du possible, aux pensionnaires sortant du Sanatorium.

Tous les malades et anciens malades, ayant au moins trois mois de séjour au Sanatorium et versant une cotisation minimum de un franc par an, peuvent participer aux avantages de l'Association.

En plus d'un Conseil d'Administration, composé de neuf membres, dont cinq choisis parmi les malades présents au Sanatorium, la Société est dirigée par un Comité exécutif composé du Secrétaire et du Trésorier. Ce comité fonctionne en permanence, au siège social, sous la présidence du Médecin Directeur. Le Comité exécutif a pour charges de surveiller et de déterminer l'emploi des fonds; il reçoit les demandes des Sociétaires et y répond; il assure enfin la réalisation pleine et entière du but de l'Association, conformément aux Statuts.

Les ressources de l'Amicale se composent:

1° Des cotisations annuelles des Membres participants;

2° Des versements des Membres fondateurs;

3° Des cotisations des Membres bienfaiteurs et honoraires;

4° Des subventions, legs et dons divers qui peuvent échoir à la Société.

L'Amicale, comme nous le disions plus haut, a pour but de venir en aide aux Membres participants, momentanément gênés, en leur donnant des secours en argent, ou en nature. Ces secours d'ailleurs variables comme importance, ne dépassent généralement pas cinquante francs; quand ils doivent être supérieurs, une délibération spéciale des Membres du Bureau est nécessaire, et peut, au besoin, être précédée d'une enquête discrète.

Mais les charges les plus importantes et les plus intéressantes qui incombent à la Société, proviennent de la délivrance qu'elle fait couramment de "*Bourses de santé.*" Ces Bourses de santé, ainsi que leur nom l'indique, sont des allocations temporaires mises, mensuellement, sur la proposition du Médecin-Directeur, à la disposition des Sociétaires dont les ressources sont insuffisantes pour continuer de se soigner et s'alimenter convenablement, à leur sortie du Sanatorium. Chaque allocation mensuelle varie de 15 à 30 francs.

C'est au Professeur Landouzy que nous devons le terme si expressif de "Bourse de santé"; c'est à lui également que nous avons emprunté l'idée de venir en aide, sous cette forme, aux "libérés de la tuberculose." Nous ajouterons enfin, que, pour la fondation de cette caisse, nous avons trouvé auprès de M. Landouzy un appui financier des plus précieux.

Aux termes des Statuts, l'Association peut allouer aux veuves et aux orphelins des Membres participants, un secours unique dont le chiffre moyen est fixé à cinquante francs.

L'Amicale de Bligny compte actuellement 472 Membres.

On peut se rendre compte des services qu'elle a déjà rendu en consultant le tableau ci-dessous, qui reproduit le total des sommes distribuées depuis la fondation, en 1906, jusqu'au 30 Avril 1908.

Actif.		Passif.	
Dons	9.326.35	*Bourses de Santé*	7,355.00
Cotisations	763.00	Secours aux Sociétaires	844.55
		Secours aux familles	570.20
	10,089.35	Médicaments	64.85
		Fournitures et imprimés	315.30
		Correspondance	55.40
			9,205.30

L'Association a donc, depuis sa fondation jusqu'au 30 Avril 1908, réparti entre ses Membres une somme de 9.205 francs 30, sur laquelle les Bourses de santé figurent pour le chiffre de 7.355 francs.

Chaque année au mois de Mai, se tient à Bligny, l'Assemblée générale de la Société et, pour la circonstance, l'Administration du Sanatorium offre un déjeuner de fête.

Dans notre grande salle à manger, nous réunissons les Anciens pensionnaires avec les malades encore en traitement, et c'est un spectacle des plus réconfortants que celui qui nous est offert par cette réunion familiale où, nouveaux et anciens, fraternisent à plaisir; les uns heureux de revoir la *Maison* bienfaisante et d'y retrouver des camarades, les autres, le coeur rempli d'espérance par la vue de camarades, qui ont pu, guéris, regagner leur foyer.

Pour rendre plus fréquents les relations utiles qu'ils nouent entre eux, comme pour étendre les bienfaits de la solidarité, les Membres de l'Amicale ont décidé la création d'un petit Bulletin trimestriel, qui, dans l'avenir, pourra paraitre plus fréquemment, si les ressources de la caisse le permettent.

Depuis que j'observe le fonctionnement et la marche de cette Société j'ai pu me convaincre qu'au fur et à mesure qu'elle progressera et que lui arriveront des subsides plus nombreux, l'Association de nos Anciens sera pour tous des plus précieuses. Bien que toute jeune et presque à ses débuts l'Amicale de Bligny, a rendu et rend encore de signales services. Je la vois chaque jour réaliser entièrement le but que je me proposais en la fondant, c'est-à-dire, maintenir, au delà du Sanatorium, l'homogénéité de notre grande famille, et créer un centre où nos Anciens puissent s'adresser, sans gêne, ni arrière pensée, comme des ayant droit, et non comme des solliciteurs de secours charitables. Nos Anciens malades, en rapport avec nous, et par nous, avec leurs camarades, forment un tout solidaire et trouvent, hors de nos murs, tout les bienfaits dûs à l'influence de l'Ecole-Sanatorium.

Cette organisation, en pleine prospérité, parviendra, nous en avons l'intime conviction, à rendre à nos pensionnaires et anciens pensionnaires partie des bienfaits que procurent les *Assurances* dans les pays où elles fonctionnent; c'est encore à ce titre, qu'il nous a paru intéressant de faire connaitre l'Association amicale des pensionnaires et Anciens pensionnaires du Sanatorium de Bligny.

CONTRIBUTION TO THE STUDY OF THE TREATMENT OF INCIPIENT PULMONARY TUBERCULOSIS.

By Dr. Eduardo Liceaga,
Mexico City.

As the program of this Congress embraces the study of tuberculosis from every point of view under which it can be considered, and as the Congress has made a call on the scientific and practical men of all countries, so as to combine in a single thesis all the knowledge which, for the moment, we have on that important subject, I consider myself in duty bound to offer my modest contribution, in order to comply with the call which has been made on me, and with the commission which I have received from my country, and from the State of Guanajuato in particular, to represent it here.

As I can only occupy the attention of the gentlemen who listen to me for as brief a time as possible, I propose to present a summary of the subject of which I treat in this paper, referring those who desire to go further with me in this study to the books which I have published and which treat the subject more at length.*

It is now thirty-four years ago that I commenced to employ the therapeutic method which I desire to advocate. I discovered it by a mere chance and commenced to make tests of it with a good deal of fear, because it did not at first inspire confidence in my colleagues in the profession. The method is not absolutely uniform, as can be easily understood by all those who practise medicine; but varies in many details according to the age of the patient, his constitution, his previous record, and other concomitant data, because we well know that it is our mission to cure patients and not diseases.

Having laid down this preamble, I will now proceed to explain the method of treatment I at present employ, taking advantage of the lessons which we have learned through the establishment of sanatoriums, of the

* Contribution to the study of the treatment of tuberculosis by the methods herein indicated, and more especially by the use of calomel. Paper read before the International Congress of Berlin, by Dr. E. Liceaga, June, 1890.

Contribution to the study of the treatment of pulmonary phthisis by Dr. E. Liceaga, Mexico, March 6, 1901.

open-air cure, of day camps, and, more especially, those which I have acquired in the course of home treatment.

I would observe that I have always practised my profession in the city of Mexico, situated in 19° 24′ 17″ of north latitude, and 98° 36′ 46″ of longitude west of Greenwich, at an elevation of 2280 meters above sea-level; that it has an average temperature of 15° 5′ Centigrade the whole year round; that we rarely see snow; that on account of the elevation the radiation is very active; that we have a clear sky almost all the time; and, finally, that the rains last for about six months in the year, while the other six are dry.

Another important point is that in these remarks I particularly refer to tuberculosis in an incipient or slightly advanced stage.

My endeavors have been directed to the treatment of tuberculous patients, either in the city itself or in the small neighboring towns, by imitating as far as possible the treatment which they would receive in a sanatorium.

Another important circumstance is that a great number of the patients whom I have attended and who came from the coast, especially from the city of Mérida, capital of the State of Yucatán, have derived some benefits from the difference of altitude. They contracted the disease at sea-level in the torrid zone, and I have made them rise to the elevation of the central tableland of Anáhuac, and this change alone has been the first and most important factor in their cure. But the good success of the therapeutic treatment has been confirmed by the cure of the patients who contracted tuberculosis in the city of Mexico itself, and have been cured in that city, with a promptitude that was in proportion to the shortness of the period before they came under treatment. The method now employed is the following:

When I attend a patient in the city, I advise him to select a house or apartment which is not in the basement, or which at least is raised above the level of the ground, so that it can be ventilated below the floors; that the room inhabited by the patient should, if possible, have a southern aspect, and if this cannot be arranged, that it should at least have an eastern aspect; that it should be ample in size, well ventilated, and clean, with only the indispensable furniture; that it should be equipped with long chairs or comfortable arm-chairs, which will permit the patient, if necessary, to rest for the greater part of the day and keep himself well covered, but with the windows open; I also strongly recommend them to arrange their meals, their hours of sleep, and their amusements as is usually done in the sanatoriums. In one word, I make them imitate in their homes the methods of living which obtain in those establishments.

As the statement I am making is founded on a study of the observations I have set forth, I do not consider myself obliged to enter into an enumeration of all the means employed in the medical treatment of pulmonary tu-

berculosis, but rather of those which have enabled me to reëstablish the health of my patients or to delay the progress of the disease.

I am still further encouraged to report on the means which I have employed by the numerous cures which I have been able to obtain, the exact number of which I cannot specify, not only because I have been unable to continue the numerical analysis of the observations which I have recorded, but also because I did not write down these observations for many years, and I cannot count the number of tuberculous patients whom I have attended during thirty-four years. But as I am convinced that I have succeeded in obtaining many complete cures, a great many of them in persons who live in the city of Mexico, I have decided to explain on this occasion the methods which I adopt for the treatment of tuberculosis.

In the paper which I read in the International Congress which met in Berlin in 1890 I stated in detail the series of considerations which suggested to me the therapeutic methods which I employ, the time of my first attempt in that direction, and the systematic applications which I have continued to make of that method since 1874. As all this has already been published, I will not weary the attention of the Congress by repeating what I have already said on another occasion.

As soon as the symptoms show me that I am dealing with a tuberculous patient, I commence the application of calomel, in doses of one centigram every half-hour. I continue the administration of this medicament until mercurial gingivitis and colitis set in, on which I at once suspend the treatment and commence to cure the inflammation of the gums or the colitis, however slight they may be. At the same time I commence the application of flying blisters at the height of the place where the initial lesion presented itself. This application I repeat every five or eight days, above, below, or on one side of the original point. If the lesion is also perceptible in the front of the thorax, I there continue the application of the blister, and in the lateral parts as well, if the lesion has extended that far. If I note any marked improvement, I delay the application of the blisters, as much as ten or twelve days; but I continue, whatever may be the number I may find it necessary to employ, until I obtain the disappearance of the hardening in the lung. As there are many persons in whom the renewal of the blisters conduces to the formation of small pustules and even boils round the places where they have been applied, I attend to these, and in place of the blisters, I apply the thermocautery, with 25 or 30 points of that apparatus. When I employ this method, I repeat the applications every three or four days. With very timorous persons, I substitute the blisters by repeated applications of tincture of iodin or an ointment with bi-iodid of mercury.

If the patient is suffering from gastric or intestinal catarrh at the time I commence the treatment, I still administer calomel, but I follow it up by the

appropriate method to obtain the reëstablishment of the digestive functions, as their healthy condition is indispensable, both for the feeding of the patient as well as for the administration of the other medicines of which I will speak.

If the digestive apparatus is in a healthy state, I commence the administration of iodid of sodium in a 5 per cent. aqueous solution, commencing with five drops and increasing five drops every day until the patient reaches the limits of physiological toleration, when I make a fresh start with five drops. If the system will not tolerate the iodid of sodium, I substitute iodid of strontium, in which case I prefer to employ the Paraf-Javal solution. If the iodids are not tolerated, I employ iodoform, and if this is too repugnant to the patient or his system will not tolerate it, I administer gradually increasing doses of tincture of iodin. I continue the administration of iodid as well as the blisters as long as there is any hardening in the lung, but I suspend this treatment whenever any digestive perturbation supervenes, or in order to resort to the other treatment which may be demanded by any of the complications which may present themselves in the course of the principal disease.

I have for many years applied simultaneously with the iodid, arsenic, and strychnin, the following formula:

Arseniate of sodium	0.03 gram
Sulphate of strychnin	0.06 gram
Extract of gentian, rhubarb, or quassia	3.00 grams

This I have made up into thirty pills, of which one is taken with each of the three principal meals.

Since the use of cacodylate of sodium has been introduced, I have substituted this drug for the arseniate of the same base, in the above formula. In those cases in which the cacodylate is not tolerated by the digestive apparatus I have commenced to administer this substance by means of hypodermic injections, with such success that under its influence the temperature rapidly lowers and the fever in many cases disappears. Since then I have suppressed the cacodylate from the above-mentioned formula and employed it exclusively under the form of hypodermic injections, which are repeated every day until fifteen injections have been applied, and then I suspend it for eight or ten days before commencing a new series.

From the very beginning of the treatment I establish the hygienic methods above mentioned. I insist on a diet that shall be, as far as possible, both abundant and varied; I recommend those patients who are accustomed to take milk in their food to drink it between meals, as other persons drink water, beer, or wine; I strongly insist on not forcing the digestive organs, but I have the food slowly and progressively increased.

Under the influence of these methods the improvement makes itself felt after the first few days; the temperature commences to descend, and the feverish attacks are of shorter duration; if the patient has suffered from sweats, they are diminished; the fits of coughing also are diminished in duration, intensity, and frequency; the appetite revives, the strength begins to return, and the progressive increase of weight in the body shows better nutrition. At the same time it is observed that the air penetrates with greater ease round the initial lesion in the lung. If the improvement progresses, the data furnished by percussion do not delay in corresponding to those shown by auscultation.

If everything progresses favorably, no innovations should be introduced into the method; at the utmost the application of the blisters might be delayed, and the administration of iodid and strychnin might be suspended from time to time, or the application of injections of cacodylate.

There are some patients in whom the favorable evolution of the disease is continuous, and whose return to health is obtained in two or three months. Even in such favorable cases the hygienic and medical treatment must be kept up for a long time. If the patients come from the coast, they cannot be permitted to return to their homes until the cure is perfectly certain, and the physician can ascertain, by means of periodical examinations, that the disease has not made a fresh appearance. If any doubt still remains, he can resort to radiography, which allows the physician to make certain that the lung has recovered its transparency in those places in which its opacity formerly indicated tuberculous nuclei.

Unfortunately, affairs do not always progress as above. Either through infringement of the precepts of hygiene, or in spite of the treatment given, the evolution of the tuberculosis progresses, either because an attack of influenza, bronchitis, or pleurisy supervenes, whether close to or far from the focus, or else pneumonia develops, the cough returns or increases in intensity, the temperature rises, or the fever, which was considered extinguished, again appears, and in a general way the physical means of exploration discover an increase in the local lesion which has engendered the manifestations I have above spoken of, or discover some of the complications I have above referred to. In these cases I again commence that treatment, but with the modifications that I will proceed to describe.

Should the complications assume the serious character which I found when I first saw the patient, I administer, as I then did, one centigram of calomel every half-hour, and I even resort to the use of mercurial ointments to obtain a rapid saturation. If the accidents are less intense, I administer a centigram of calomel every hour, or even half a centigram, if the attack is still lighter. If new parts of the lungs are invaded for the second or third time, I again administer calomel, but in smaller doses and at longer periods.

If the state of the digestive organs advises that I should abstain from the use of calomel, or if the new invasion manifests itself slowly and treacherously, I resort to the use of blue mass in doses of five centigrams per day, for three or four weeks. I have had to repeat the application of mercury as much as four times in the course of the disease.

If a limited pleurisy supervenes, I make repeated applications of flying blisters in those points in which the disease has made its appearance. If the bronchitis is fetid, I add to the ordinary resources inhalations of compound tincture of benzoin from the American pharmacopœia in accordance with the following formula: I mix a teaspoonful of this substance with 100 parts of boiling water; I place this mixture in a small porcelain teapot, on whose spout I fit a rubber tube to protect the patient's mouth and facilitate the application, and I then order that the inhalation shall be repeated for the space of one minute every six hours. If the bad smell does not disappear from the sputa, I substitute a 2 per cent. solution of carbolic acid.

In all these cases I oblige the patients to keep their rooms and remain entirely at rest until the complications disappear.

Influenza is the most serious complication which a tuberculous patient has to fear. He may consider himself very fortunate if it only retards the favorable progress of the disease toward a cure; but, as a general rule, it aggravates the original disease, and the exploration of the thorax leads to the discovery of fresh foci of pulmonary tuberculization, at the same time that the fever reappears, if not already set in, or else that already existing is increased; the cough becomes more frequent and more intense in its attacks; the patient loses appetite and his strength visibly decreases. When ulcerations commence to cover a certain area, an examination of the sputa leads to the discovery of streptococcus and staphylococcus, mixed or not with the Pfeiffer bacillus. This complication may for a long time delay the cure. When the disease is more advanced, or the attack of influenza has been very serious, the patient may succumb. I commence the treatment for influenza by the ordinary methods, and once that has passed, I again begin the treatment with calomel and repeated blisters.

If the disease does not show any disposition to disappear, I also employ the other therapeutic means which are well known, such as the arsenical drops of Hoff, creosote, guaiacol, etc.

In conclusion, I have to state that I have very carefully studied the treatment which I recommend; that if any doubt could be felt of its efficacy with patients who come from the coast to the central tableland, and in whom the mere change of climate is a favorable factor for their cure, the same cannot be said with those persons who have contracted the disease in this city, and who live under the same conditions both before and during the course of the disease.

THE CITY OF MEXICO AND NEIGHBORHOOD AS A SANITARY STATION FOR CONSUMPTIVES.

By Dr. Eduardo Liceaga,
Mexico City

In the International Congress which met in Berlin in the year 1890 I read a paper to which I gave the same title as the above. On that occasion I was unable to rouse the attention of practical men, as the Congress on Tuberculosis, which met in the same city in the year 1903, explicitly stated, among the conclusions reached, that a high altitude is not an important factor in the cure of pulmonary tuberculosis. I believe that if this conclusion was reached, it was because the delegates to that Congress did not take into consideration elevations of more than 300 to 500 meters above sea-level; and did not take into account those which vary between 1500 and 2400 meters above the sea, such as we find in the central tableland of Anáhuac.

I again desire to insist, with the specialists of all countries who are present in this important meeting, on the benefits which can be derived from a residence at these altitudes in the cure of pulmonary tuberculosis.

As I have practised my profession of physician in the city of Mexico during forty-two years, I find myself in a position to point out the exceptional advantages of the climate throughout the valley in which that city is situated, and the great advantages it offers for the cure of consumptives.

The rapidity with which pulmonary phthisis progresses in the cities of our littoral on both seas presents a great contrast to the comparative slowness with which it develops on the tableland of Anáhuac.

There can be no doubt that the elevation above sea-level must exercise an influence on the infinitely small beings, as well as on the large vegetable organisms, which cover the surface of the globe.

Sugar-cane, tobacco, and coffee develop in the torrid zone, while at high elevations these same plants either cannot live or have a weak and undeveloped life. The same thing happens with the inferior organisms, as has been demonstrated by Dr. Gaviño with respect to the germ of diphtheria, which is attenuated on the tableland of Mexico. And in the same way as we have demonstrated the effects of that altitude with respect to the latter germ, we can admit—until we can demonstrate it by experiment—that the germ of tuberculosis also undergoes certain modifications at high levels.

To this conclusion we are led by the observation of pulmonary phthisis as found in those patients who inhabit the coast country at elevations between sea-level and 1000 meters, and those who live at elevations between 1000 and 2000 meters or more above sea-level. In proportion as the elevation increases the progress of the disease decreases, and the same thing may be said of the gravity of the symptoms, the number of deaths caused by the disease, also bearing in mind that in many cases we obtain even a cure simply by the change of residence of the patients, bringing them from the sea-level to a higher altitude.

This fact contains nothing new in pathology, as it has been perfectly well established up to the present moment, at least in the Mexican republic, that yellow fever is only observed in those places which are situated at an elevation of less than 1200 meters above sea-level. On the other hand, exanthematic typhus is only observed in elevated places, and disappears in proportion as the land approaches the coast of either ocean, where it is entirely unknown.

As I have observed this contrast in connection with tuberculosis, I have desired to bring it to the attention of this meeting, where a more ample development has been given to the study of this disease than in all previous Congresses, in all the scientific societies, and even in all the books which have been written on the subject.

But I am not satisfied with simply pointing out the difference, but desire to call the attention of practical men throughout the world, and more especially those of the nation which has received us here, to the immense advantages which the entire world would derive from the establishment of sanatoriums and homes for tuberculous patients at high altitudes, so that they might count on this powerful factor in the struggle against that fearful scourge. This is the new departure that I come to propose to this learned meeting, whose powerful voice will make itself heard through the entire world, and I appeal to my hearers to study this matter, grounding my initiative on the observations which, during a practice of forty-two years, I have been able to make with respect to the frequency and progress of tuberculosis in our climates, and its modifications according to the difference of altitude at which the patients live.

Observation has taught us that in the Mexican republic there are places where tuberculosis does not develop among the natives of those localities, but only among persons who bring it from other points. Among these I may mention Zacatecas, capital of the State of that name, a mining city which is situated at 22° 46′ 34″ of north latitude and 3° 26′ 21″ of longitude west of the meridian of Mexico. This city is at an elevation of 2489 meters above sea-level. The average annual temperature varies between 12° and 14° C.; the rains are not abundant, and the atmosphere, which is generally dry,

gives it a stimulating and tonic climate. The winter is cold but without excess; during that season there are some cloudy and rainy days, but this meteorological condition does not last long, and a day rarely passes without some period of sunshine.

Dr. Breña, who has practised in Zacatecas for thirty-two years, writes as follows: "Pulmonary tuberculosis may be considered rare and exceptional among the natives of the city. The deaths caused by this disease are only observed in individuals of the floating population, which is incessantly renewed, and among whom we find patients suffering from affections of the lungs, and who arrive with lesions in such an advanced stage that it is impossible to delay the fatal evolution of the disease. As regards the patients suffering from pulmonary affections and who arrive here at the beginning of the disease, it is observed that this disappears under the mere influence of the climate and a hygienic life."

Dr. J. Torres, who was examining physician for the Equitable and Mutual Life Insurance Companies, informed me that he had never found himself obliged to refuse a candidate for insurance among the natives of that locality on account of tuberculosis.

Dr. Rosalio Torres assured me that the disease never was observed among the well-to-do classes.

Dr. Prevost, an American physician who practised all his life in Zacatecas, supported the same ideas that I have above expressed, and they have also received the support of Drs. Ponce, Jesy, and E. P. Lamicq.

Another city with respect to which I have positive information is Oaxaca, situated in a mountainous country, at 17° 3′ 51″ of north latitude, and 2° 4′ of longitude east of the meridian of Mexico, with an elevation of 1550 meters above sea-level. In that city the disease is so rare that Dr. Mejía did not find more than a single person suffering from the disease when he visited the hospital. This fact is confirmed by the expereince of Drs. Fenelón, Pombo, Garmendia, Hainemann, Castillo, Vasconcelos, Alvaro, Hernández, Castellanos, and others, who have had a long residence in that city. All these physicians agree that the consumptives who reach Oaxaca from other parts of the country are either cured or greatly relieved in that city.

There is another city, called Guadalajara, capital of the State of Jalisco, where some American physicians have established a sanatorium, because they have discovered that persons who arrive there suffering from tuberculosis have obtained relief or been entirely cured under the sole influence of the climate. Guadalajara is situated at an elevation of 1540 meters above sea-level.

I will now come back to the city of Mexico, in which, as already stated, I have practised for many years. This city, capital of the republic, is sit-

uated at 19° 24′ 17″ of north latitude, and 98° 36′ 46″ of longitude west of Greenwich, at an elevation of 2280 meters above sea-level.

The city is built in the midst of a delicious and very extensive valley, having a lake of fresh water to the south called Xochomilco, and to the east, in the immediate neighborhood of the city, another lake of brackish water called Texcoco.

The valley is watered by numerous streams which discharge into the above-mentioned lakes, and is surrounded by an immense chain of mountains, among which Popocatepetl and Ixtaccihuatl occupy a prominent place on account of their elevation and their snow-covered peaks. The atmosphere is transparent and diaphanous and the valley enjoys a brilliant sunshine.

From a summary published by the Central Meteorologico-Magnetic Observatory for the year 1907 I take the following data relative to the city of Mexico:

Mean annual temperature	15° 1′
Maximum temperature in the shade	29° 9′
Minimum temperature in the open air	1° 0′
Maximum variation	19° 9′
Mean annual humidity in hundreds of saturation under shelter	0.62
Mean tension of steam in the open	7.73
Evaporation in the open	8.0

A distinguished physician of Mexico, Dr. Jimenez, wrote that during his hospital practice of fourteen years he had only observed 143 consumptives out of 11,933 patients. Subsequently Dr. Mejía, in the same hospital that had formerly been under the direction of Dr. Jimenez, did not find more than 545 consumptives among 14,021 patients. In the private Hospital of Jesus, Dr. Vértiz, in a period of twenty-seven years, found 474 consumptives among 5476 patients who were there treated.

In the Military Hospital, out of a total of 1446 deaths registered in ten years Dr. Soriano only found 135 which could be attributed to tuberculosis.

I have taken the above data from a paper by Dr. Mejía.

I will now present some data collected by the Superior Board of Health which cover a period of thirty-nine years—from 1869 to 1907 inclusive. These data are shown in detail in the diagram which I will have the honor to present and which forms the subject of another paper which I will read before this conference; but from that paper I will only take the data which I require to demonstrate that tuberculosis is less frequently observed in the city of Mexico than in any other city of importance, as can be seen by the following comparison:

Number of deaths from diseases of all kinds during a period of thirty-nine years	540,839
Number of deaths caused by tuberculous disease	45,543
Proportion	8.42

I now present a table showing the proportion of the general mortality

which was caused by *pulmonary* tuberculosis during the year 1907 in the following cities, according to a table which was formed by the General Bureau of Municipal statistics of the city of Buenos Aires:

Paris	21.35
Prague	20.04
Guttenburg	17.24
Lyons	16.88
Vienna	16.73
Havre	16.72
Christiania	16.45
Lille	15.81
Geneva	15.44
Breslau	15.29
Stockholm	15.28
Nuremberg	14.51
Berlin	14.23
Frankfort on the Main	13.94
Dresden	13.84
Berne	13.76
Leipsic	13.69
Hamburg	12.77
Munich	12.68
Roubaix	12.62
Luxemburg	12.60
Dublin	12.52
St. Petersburg	12.17
Belfast	11.77
Zurich	11.67
Copenhagen	11.57
Venice	11.49
New York	11.40
Odessa	11.39
Buenos Aires	11.36
Amsterdam	10.90
London	9.66
Moscow	9.46
Madrid	9.43
Basle	9.30
Cologne	8.65

A comparison of these two statistical tables leads us to the following conclusion:

That in spite of the accidental causes which bring a large number of consumptive patients from the rest of the country and even from abroad to the capital city, the figures still remain low, as regards the mortality from consumption in that city.

But if we look at the number of deaths during the last five years, we find that the figures are as follows:

Number of deaths from diseases of all kinds	92,718
Number of deaths from tuberculous disease	8,063
Proportion	8.69

If we go further and compare this proportion with that which obtains in the first cities of the world, we will still find a difference in favor of our climate as compared with all those places, because, although it is true that

in the above table the city of Cologne shows a percentage of 8.65, we must bear in mind that in this table we only have a comparison of the mortality from pulmonary tuberculosis with respect to the general mortality from all kinds of diseases, while the statistics I present of the city of Mexico cover the mortality from all kinds of tuberculous affections. This shows an even more notable difference between Mexico and the other cities than that shown in the table.

On the other hand, if we take into account that in Mexico we have no sanatoriums in which to attend to incipient consumptives; that there is no special department dedicated to patients of this class in the General Hospital, we cannot but agree that the disease commits less ravages in the city of Mexico than in others.

I do not wish you to believe that I consider the attendance in sanatoriums as capable in itself of curing all cases; but that it is one of the many resources which should be utilized for the cure of consumptives, as they contribute to that end by subjecting the patients to a constant supervision, to a well-ordered discipline, to an education which teaches them how to observe and take care of themselves, as well as how to care for the persons who surround them; because they furnish them sound and well-cooked food and give them the benefits to be gained by breathing pure air in a mild and pleasant climate during all seasons of the year.

I desire to call the attention of all the scientific men here assembled, and more especially of those who have any intention of establishing international sanatoriums, to the advantages which are offered by the climate of Mexico, on account of the uniformity of its temperature, the purity of its atmosphere, the number of days when we have sunshine, the facilities for reaching the capital city, not only from all points of the republic, but also from the United States, Cuba, etc.

As the temperature is not excessive at any season of the year, the city of Mexico is utilized as a summer resort by persons who live in the hot country along the coasts of our republic, as well as by the inhabitants of the temperate regions of both North and South America. As the temperature during winter is not only not excessive, but rather notably moderate, as shown by the meteorological data above given, the city and surrounding towns of Mexico are an agreeable winter resort for all the inhabitants of America who reside out of the torrid zone.

A consideration of the general conditions I have above referred to leads me to propose that the valley of Mexico be selected for the establishment of an international sanatorium, especially dedicated to the cure of persons who suffer from tuberculosis.

THE RELATION OF ATMOSPHERIC AIR OF HIGH ALTITUDES TO TUBERCULOSIS.

By Dr. Daniel Vergara Lope, M.S.A.,
Mexico City.

In remote epochs, in all places, and in conventions similar to the present one, the action that the climate of high altitudes exercises on the organism of consumptives has been studied with reference to its prophylactic and therapeutical importance in a disease as terrible as that caused by the bacillus of Koch. It is my duty and in my power, owing to personal studies made during years past, to call attention to-day, once more, to this subject of vital importance.

New elements acquired by experiments (some of them by other authors) have lately confirmed the results of my own experience.

A few of these have been clearly explained in the book called "La Vie sur les Hauts Plateaux," a work that had the honor of obtaining a very high distinction in the Hodgkins competitions of 1895, opened by the Smithsonian Institution of Washington, D. C.

One more reason I can give for occupying myself with this subject. At present, even among medical men, it is recognized as a fact acquired by science that the climate of high altitudes is most beneficial to tuberculosis and persons predisposed to that malady; although the clinic has been advising us on this point during past ages, and although voices have been raised (voices as reliable as those of Dr. Liceaga, President of the Board of Health of Mexico; physicians in Davos, Switzerland, and many others) offering convincing proofs of the truth of this assertion, we frequently hear the expression of doubt among those who know only that in certain elevated places, such as Mexico, 2286 meters above the level of the sea, in which during long years it was believed that tuberculosis was unknown, or almost unknown, it is now observed that this illness carries a large number of inhabitants to the grave.

Noting the continual advancement, without diminishing, that tuberculosis has made in these places, and, a priori, without counting the numerous factors that at the same time present themselves as efficacious co-workers, in an illness so terrible, one would actually believe that the so-called opposition of climate is only a chimerical illusion, born of minds easily impressed and weakly inclined to praise the beauties and advantages of the climate of

high altitudes. But it is not so, and I propose to treat, later on, of this subject; so that we may study what the factors are which thus destroy the advantages offered to us in the higher altitudes. I will now occupy myself in the scientific explanation, which, in my opinion, is the true and incontestable one, regarding the beneficent action exercised by climate on tuberculosis, and how it also opposes the propagation of this disease, which is observed among the inhabitants of inferior levels.

This is not the place to enter into demonstrations that have already been published in special memoirs, and very extensively in the book mentioned in a previous paragraph; I will limit myself to name only those that serve as a basis for the study that at this moment interests us.

The individual living in higher altitudes is subject to undergo in his physiology certain important changes that make him fit to live in a dry and rarefied atmospheric medium. His organs of respiration and circulation are, above all others, subject to these modifications, namely:

1. The increase, in proportion to the altitude, of the number of respiratory movements and of the beatings of the heart.

2. In the proportional increase of the respiratory capacity of the lungs and blood.

3. In the greatest amplitude of the thoracic movements.

4. In the proportional densification of the blood and of all the liquids of the organism.

5. In the proportional diminishing of the tension of the blood in the interior of the circulating blood-channels.

The study of these modifications has occupied the greater part of my time in the laboratories since the year 1889, and the results that I have been able to obtain have been confirmed by experiments in Europe and North America.

There is no doctor who, by the simple examination of the propositions just shown, cannot understand that almost always the clinical view presented by consumptives may be modified in a favorable manner; above all, in cases of tuberculosis of the lungs.

The easiest and widest expansion of the lungs, the most active circulation of the air and blood through the respiratory tubes and through the cells of the lungs, the irrigation of all tissues in the economy of a more concentrated blood, that is to say, richer in equal volume, in hematics, and in phagocytes, and the tendency to drying of the mucous respiratory membrane, are, without doubt, means sufficiently powerful to cause extremely favorable organic changes.

When an individual, healthy or ill, is transported from lower levels to the higher altitudes, these modifications are not produced little by little; they are almost simultaneous with the assent, and more remarkable in those suffering from tuberculosis.

This we can explain, for frequently we find sick persons not suffering from secondary complications, and not being in any advanced state of illness, rapidly improve by simply being transported from the coasts to the central tableland of Mexico. But this notable improvement that can lead the way to a complete cure may be observed only when the change of level is considerable, and this takes place only in those countries where great elevation coincides with bearable temperature, like those of the valley of Mexico and the much more elevated ones, Peru and Bolivia.

In fact, there exists in the altitudes only one factor that may offer opposition: that is, the gradual diminution of temperature—a subject of which I will treat later.

I will speak first of two factors: viz., the depression of atmospheric pressure and the dryness of the air. The diminishing pressure of the atmosphere produces the increase of circulation of the air in the lungs. In Mexico the number of respirations is 22 per minute, in place of 16, as at the level of the sea, this increase corresponding to the diminishing of barometric pressure in Mexico in relation to that of the sea. The low pressure expands the lungs, in the same way as an apparently empty globe expands when placed beneath the bell of a pneumatic machine.

Jaccoud, the well-known, world-renowned practitioner, was the first to call attention to the advantages of this phenomenon, and tells us that "when the respiratory surface of the lungs is expanded, the sluggish parts of this organ are forced into action."

This also causes a large quantity of blood to flow to the surface of the skin and that of the respiratory organs.

This is one of the first phenomena that the lessening of pressure produces, and, although relatively light, causes from the onset a more uniform distribution of blood through that organ, and at the same time helps to regulate the changes and causes the disappearance of the partial congestion in the unhealthy parts.

There is, then, a derivation of blood such as is produced by a cupping-glass, only that in this case, instead of driving the blood toward the skin, the derivation takes place in the lungs from the unhealthy parts to the healthy ones. On the other hand, the want of pressure causes diminishing pressure in the lungs in general and the lessening of tension in the blood-tubes.

Here, then, is the mechanism by which hemoptysis is combated. It is not unusual to see patients who are victims of this accident before leaving lower levels reach the central tableland free from it.

Let us call to mind that D'Orvigny tells us more when, in his reports, he refers to the sanatorium at Jauja, in high Peru, situated at more than 4000 meters above the sea-level. The state of the vascular tension is a phenomenon of the physical order, about which I spoke in the memoir

presented by me to the National Academy of Medicine in Mexico, in order to gain the honorable place that I now hold there. It is a phenomenon to which all the organisms of those inhabiting high altitudes are subject, and which I have been able to study experimentally, finding that, in equal circumstances, the vascular tension is in direct opposition to the barometric pressure.

After those phenomena, that are consequences of the rarefying of the air, let us consider those that depend especially on the dryness. It has been demonstrated with all evidence that among the altitudes the dryness of the air increases with the degree of elevation. Now, then, the influence of the hygrometry over the transpiration of the skin and of the lungs has been the object of the investigations which have, for our study, a special interest. William Edwards has demonstrated that the transpiration which takes place at the surface of the skin and in the mucous respiratory membrane ought to be classified among the physical phenomena, and compares it to that which one observes when a porous body impregnated with water is placed in the same conditions of atmospheric rarity and dryness. The exaggerated dryness of the air provokes, at the maximum, the intensity of transpiration.

Dr. Denison has also demonstrated, by means of conclusive experiments, that in Denver, U. S., at 5350 feet of altitude, one loses through the skin and lungs a quantity of water double that which one loses at the level of the sea. Veraguth has demonstrated the same phenomenon. It has also been perfectly proved by American and European authors that the increase of solid elements of the blood in a like volume is one of the most important facts among those which we observe as the result of living in high altitudes. The observations of Moeller at Davos, of Runert, Stherlin, Wolff, Kope, Egger, Viault, Weineirl, have given a sufficient number of points on a subject so important, among those of the biology of the altitudes. This, then, is the direct phenomenon connected with atmospheric dryness. The experiments that I have made cause me to firmly believe that it is so. In my judgment the pretended hyperglobulia of high regions is in reality only apparent. The blood, on losing water, becomes denser, and so we see that while in Europe this liquid is marked with a normal density of 1054 to 1060 (maximum), I have found in Mexico 1060 to 1067.5; and, as a medium, 1063.2, the normal cipher of red globules being, according to my observations, from 6,000,000 to 6,300,000 as an average. Dr. Moeller, who has dedicated his time to making long and patient observations at the sanatorium at Davos, has shown how much more sensitive the blood of consumptives is to changes in atmospheric pressures, a slight falling of the barometric column being generally sufficient to increase the hemacias of the patients at the sanatorium. For my part I have been also able to observe, but in a healthy man, that the number of erythrocytes can be made to vary in a very short

space of time by subjecting the persons to variations of pressure in a large pneumatic cabinet, and I observed, at the same time, the changes in density of the same liquid; the details of these experiments, as also the discussion of theories on the hyperglobulia of the altitudes, may be found in the book that has been several times mentioned. The production of these beneficial changes for tuberculosis may be obtained by means of a pneumatic cabinet of rarefied air. A few years ago, in the National Medical Institute of Mexico, I applied this treatment and obtained, in some cases, gratifying results.

My practice in this field was not extensive, and, of course, I do not dare to present definite conclusions; but I believe that the studies made by the doctors (North American practitioners), and the results thereof, are worthy of attention.

In the book by Dr. S. A. Knopf, of New York, called "Modern Prophylaxis of Pulmonary Tuberculosis" (1899, pp. 218 to 222), the following may be found: "The action of the pneumatic cabinet has been described by many authors, such as Bowditch, Fox, Houghton, Hudson, Jensen, Ketchum, Westbrook, Williams, and others. In perusing the extensive literature on the subject I found Platt's exposition one of the clearest. His experience accords with mine in almost every detail."

Quimby, who is probably the best authority on the treatment of tuberculosis by means of the pneumatic cabinet, gives as conclusions to one of the most remarkable papers written on this subject, and read before the American Climatological Association at Richfield Springs, N. Y., June 24, 1892, the following interesting table:

RELATIONS OF THE PNEUMATIC CABINET TO THE DESTRUCTIVE FORCES OF PULMONARY PHTHISIS.

	(A) Specific.	
The Cabinet	1. Does not directly affect	1. The tubercle bacillus.
	2. Limits by rapid absorption	2. Tubercle toxin necrosis.
	(B) Local and Mechanical.	
	3. Diminishes	3. Tissue and vascular compression from:
	By (*a*) Absorption of	(*a*) Inflammatory exudate.
	(*b*) Removal of	(*b*) Necrotic products.
	4. Loosens and removes	4. Alveolar and tubular obstruction causing ing:
	Thus (*a*) Reopening	(*a*) Collapsed alveoli.
	(*b*) Allaying	(*b*) Local tissue irritation.
	(*c*) Restoring	(*c*) Deficient oxygenation.
	(*d*) Diminishing	(*d*) Septic decomposition.
	(*e*) Preventing	(*e*) Systemic infection.
	(*f*) Minimizing	(*f*) Septic fever.
	5. Stretches and absorbs	5. Pleuritic fibroses, arresting.
	Restoring	(*a*) Respiration, (*b*) Circulation. } (Oxygenation).
	(C) Systemic.	
	6. Diminishes and retards	6. Systemic malnutrition from:
	By (*a*) Removing	(*a*) Respiratory obstructions.
	(*b*) Increasing	(*b*) Weak circulation.

RELATIONS OF THE PNEUMATIC CABINET TO THE CONSTRUCTIVE FORCES OF PULMONARY PHTHISIS.

THE CABINET

(A) SPECIFIC.

1. Increases nutrition of ..... 1. Tubercular granulations.
2. Makes dynamic ..... 2. The potential value of toxin (?).

(B) LOCAL.

3. Favors and moderates ..... 3. Productive inflammation, depending on:
   By (*a*) Traumatic increase of. (*a*) Local irritation.
   (*b*) Removing obstruction to ..... (*b*) Freedom of circulation.
   (*c*) Augmenting ..... (*c*) Nutritive vascular supply.
   (*d*) Increasing ..... (*d*) Lymphatic absorption
4. Stimulates ..... 4. Local tissue vitality, depending on:
   By (*a*) Increasing ..... (*a*) Circulation.
   (*b*) Restoring normal .... (*b*) Anatomical conditions.

(C) SYSTEMIC.

5. Stimulates ..... 5. General glandular activity from:
   By (*a*) Improving ..... (*a*) Circulation.
   (*b*) Doubling ..... (*b*) Respiratory capacity.

This diagram I here transcribe, recognizing the value that Dr. Knopf gives to it in his mentioned work, and because, in general, one observes in its principal propositions a perfect agreement with the conclusions that I have reached regarding the effect of rarefied atmospheres; and because it also comes as a valuable confirmation of my own personal investigations, although obtained in a totally distinct and independent way.

To conclude on this point, it is sufficient for me to add that Dr. Knopf gives to treatment by means of the "pneumatic cabinet" of rarefied air the second place as to efficacy after the open-air treatment, to which, he judges, it should always be united, when possible.

In elevated regions we find a few more elements that contribute to the good resulting from living there; I refer to their great luminosity, the consequence of a more transparent atmosphere, admitting in greater proportion the access of the sun's rays, and to the picturesque landscapes characteristic of elevated lands, which, far from depressing, raise and enliven the mental powers, and for their special conditions of great beauty, are an attraction for, and admired by, the whole world.

I have finished with this short explanation, on a point so important, and which will become even more so, until we possess a medicine of sure and efficacious action, serum, vaccine, or any other, such as exists to-day, like a faint hope of future success, in the laboratories of Behring, Roux, Maragliano, etc.

CONCLUSIONS.

As a summary of this memoir, I have the honor of presenting to your judgment the following conclusions:

1. It has been perfectly demonstrated, not only by the clinic and by

close observations, but also by physiological experiments, rigorously scientific, that the climate of the altitudes exercises a beneficent action on the organism of consumptives, above all, when the places where this benefit sought for have a very considerable elevation, about 6000 to 12,000 feet above the level of the sea, and the other factors of climate, temperature, etc., are favorable.

2. This good-producing action is in direct relation with the physiological effect that dry and rarefied atmospheres have upon the organism of the individual living there. The respiratory and circulatory apparatus are especially those that undergo modifications in their functions, and these modifications are: (*a*) An increase, proportional to the altitude, of the respiratory movements and pulsations of the heart. (*b*) An increase, also proportional, of the respiratory capacity, as well of the lungs as of the blood. (*c*) Greater amplitude of the thoracic movement. (*d*) The proportional densification of the blood and other liquids of the organism. (*e*) Proportional diminution of the intravascular tension.

3. As a direct consequence of these phenomena, one observes, in the organism of consumptives, the following effects: (*a*) Greater activity and regularity of the respirations of the lungs and circulation, and consecutively of the oxygenation; diminution of the dyspnea. (*b*) Greater activity in the nutritive changes in direct relation to the circulation in the membranes, blood denser and better provided with oxygen, and, in general, with nutritive elements. (*c*) Notable increase of defensive forces in the organism, also in relation to the densification of the blood; phagocytosis more active; antitoxins more concentrated. (*d*) A tendency to dryness of the mucous membranes, to the reabsorption of the exudates, the calcification of the tubercles and tuberculous ulcerations by greater loss of water in the organism in relation to the cutaneous pulmonary transpiration proportionally more active. (*e*) Diminishing and even complete disappearance of the hemoptysis, by the lessening of the vascular arterial tension; of local congestions of the lungs by a much more liberal circulation and increase in density of the blood.

4. Treatment, by means of the pneumatic cabinet, of rarefied air has an effect on the organism of consumptives similar to that produced by naturally rarefied atmospheres, and one ought to have recourse to it, together with some other treatment, such as closed treatment in sanatoriums, open air, rest, etc., especially in such cases when the transportation of patients to higher plateaux is impracticable.

DIE EINRICHTUNG EINER HEILSTÄTTE, DIE ZUR BEKÄMPFUNG DES LUPUS—EINER CHRONISCHEN HAUTTUBERKULOSE—DIENT.

Von Professor Eduard Lang,
Wien.

Neben den allgemeinen Massnahmen, die darauf gerichtet sind, der Verbreitung der Tuberkulose entgegenzutreten, ihre Infektionswege zu verstopfen, die Menschen teils durch Verbesserung ihrer sozialen Lage, teils durch immuno-chemische Proceduren gegen den Tuberkelbacillus zu kräftigen, zu immunisieren, ist es auch Pflicht der Gesellschaft, für jene Unglücklichen zu sorgen, welche bereits der Krankheit verfallen sind und sicher, wenn Rettung ausbleibt, physisch oder sozial zu Grunde gehen.

Eben darum gehört es im Kampfe gegen die Tuberkulose zur wichtigsten Aufgabe, sich aller Tuberkulösen anzunehmen. Dabei darf man sich selbstverständlich nicht auf die Lungentuberkulose allein beschränken, sondern hat die Tätigkeit in gleicher Intensität auch auf Tuberkulose des Bewegungsapparates: Knochen, Gelenke, Sehnenscheiden; des Lymphapparates, des Verdauungstraktes, der Haut und der Schleimhäute, auf Skrofulöse im allgemeinen auszudehnen. Jodkuren und Solbäder, Seehospize und Walderholungsstätten zählen da zu den wichtigsten Einrichtungen; sie erfüllen um so sicherer ihren Zweck, wenn sie überdies derart ausgestaltet sind, dass etwa notwendige Lokaleingriffe und sonstige kleinere und grössere Operationen an Ort und Stelle sachgemäss durchgeführt werden können. Es lassen sich dann—wie ich mich wiederholt überzeugt habe—sehr zufriedenstellende Resultate erzielen.

Ganz spezielle Einrichtungen verlangt die Bekämpfung der unter dem Namen *Lupus* bekannten chronischen *Hauttuberkulose.* Es verdient das um so grössere Aufmerksamkeit, als die Lupuskranken, wenn sie rechtzeitig eine ordentliche Behandlung erfahren, zu einem sehr hohen Prozentsatz zur Ausheilung gelangen, erwerbs- und berufsfähig werden, ja selbst einen Hausstand gründen und nützliche Mitglieder der Gesellschaft werden können, während sie, unrichtig oder gar nicht behandelt, zu allermeist durch Entstellung und Verkrüppelung sozial unmöglich und sodann sich, der Familie oder öffentlichen Fonden während der ganzen Lebensdauer zur Last werden. Es ist also geradezu Pflicht der Gesellschaft, Einrichtungen zu

schaffen, die der Bekämpfung der chronischen Hauttuberkulose, der Heilung des Lupus, dienen.

Wie sollen die Einrichtungen beschaffen sein? Glücklicherweise bestehen jetzt an vielen Orten Heilstätten für Lupuskranke; die meisten sind der Mutteranstalt in Kopenhagen, dem Finsen'schen Lichtinstitut, nachgebildet. Wegen der Eigenartigkeit der Einrichtungen in der Wiener Heilstätte für Lupuskranke werde ich mich nur mit der Darstellung dieser befassen.

Wie bekannt, ist die operative Behandlung des Lupus seit Thiersch in eine neue Phase getreten; diese Behandlungsmethode konnte aber nicht recht Boden fassen. Erst durch Aufnahme und Vervollkommnung des operativ-plastischen Verfahrens durch *Gersuny, v. Eiselsberg* und mich ist es gelungen, der medizinischen Welt die Überzeugung beizubringen, dass die *Exstirpation des Lupus* eine *radikale Methode* darstellt und dass der gesetzte Defekt sich in cosmetisch und funktionell tadelloser Weise decken lässt. Die Resultate sind dem Umstande zu danken, dass ich im Gesichte und an den Händen, wo es nur angeht, gestielte oder stiellose Lappen aus der ganzen Hautdicke verwende, statt der dünnen, zarten Thierschstreifen.

Von mir bezw. unter meiner Aegide sind bis Ende 1907 369 Lupuskranke operiert worden.

Mindestens ein halbes Jahr später, als die Operation stattgefunden hatte, haben wir hievon wiedergesehen	243	Patienten
Vollkommen geheilt blieben hievon	198	"
Wegen kleiner Rezidivestellen oder suspekter Stellen wurde eine kleine Nachoperation unter Cocain gemacht bei	13	"
Welche wir dann neuerlich länger als ein halbes Jahr beobachtet und rezidivfrei befunden haben. Zu den rezidivfreien Fällen sind noch zu zählen, welche ausserhalb des Operationsterrains später Lupus aufwiesen, offenbar Nachschübe von einem okkulten Herd aus, ein Ereignis, welches das Operationsresultat weiter gar nicht trübt.	3	"
Die Operation hatte somit Erfolg bei	214	"

Ausser den 214 Kranken haben wir bei weiteren 10 Patienten wegen kleiner Rezidivstellen oder suspekter Punkte kleine Nachoperationen vorgenommen, jedoch die Patienten noch nicht nach einer entsprechenden Frist nachrevidieren können, so dass diese Patienten noch nicht den "Rezidivfreien" zugerechnet werden, zu denen sie eigentlich gehören.

In die gleiche Kategorie zählen weiter 10 Kranke, bei welchen wegen kleiner Rezidiven unbedeutende Eingriffe *empfohlen,* jedoch von ihnen noch nicht zugegeben wurden.

Schwere nicht operable Rezidiven sahen wir bloss bei 9 Patienten, von welchen

7 dem ersten Drittel unserer Operationsfälle
2 dem zweiten Drittel " "
0 dem letzten Drittel " " angehören,—

der beste Beweis, dass die Indikationsstellung zur Operation sich verfei-

nert hat und die Technik der operativ-plastischen Methode bedeutenden Fortschritt aufweist.

Von den 214 Rezidivfreien sahen wir nach der letzten Operation:

1	Patient	nach	16 Jahren
1	"	"	14 "
2	Patienten	"	13 "
1	"	"	12 "
2	"	"	11 "
1	"	"	10 "
3	"	"	9 "
4	"	"	8 "
5	"	"	7 "
9	"	"	6 "
19	"	"	5 "
12	"	"	4 "
25	"	"	3 "
38	"	"	2 "
60	"	"	1-2 "
31	"	"	½-1 "

Die hier angeführten Resultate sind so befriedigend, dass das *operativ-plastische* Verfahren in jeder Heilstätte, die der Behandlung des Lupus dienen soll, unter den *ersten Methoden* Platz finden muss. Dem operativ-plastischen Verfahren kommt aber neben der Sicherheit des Erfolges auch noch der Vorzug zu, dass die Behandlungsdauer sehr kurz und infolgedessen nicht teuer ist; als weiterer Vorzug sei noch angeführt, dass man fast stets die Operation unter Schleich'scher Lokalanästhesie ausführen kann.

Leider ist die Exstirpation nicht immer anwendbar: sie ist nur für jene Fälle indicirt, wo der lupöse Herd deutlich abgrenzbar und damit die Möglichkeit gegeben ist, im Gesunden zu operieren, also nichts Krankes zurückzulassen. Die Zahl der Krankheitsherde und ihre Ausdehnung können für den Geübten keine Kontraindication abgeben.

Lässt sich das Lupöse nicht abgrenzen—was meist bei Lokalisation in der Schleimhaut: der Nase, des Mundes, des Gaumens, etc., der Fall ist—dann ist die Exstirpation nicht angezeigt; *der Lupus ist inoperabel;* ebensowenig in Fällen hochgradiger Anämie und für die Operation ungünstigen Komplikationen; für die *inoperabeln* Fälle, welche leider noch immer die grosse Majorität bilden, gilt die *Belichtung nach Finsen* als vorzüglichstes Verfahren. Die Erfolge sind allgemein bekannt, so dass weitere Ausführungen unterbleiben können. Die Methode hat nur einen Nachteil: sie stellt sich sehr teuer und beansprucht eine sehr lange Behandlungsdauer.

Es bedarf keines Beweises, dass eine Heilstätte für Lupuskranke nur dann ihren Zweck erfüllen kann, wenn sie ebenso die operative Behandlung wie die Phototherapie nach Finsen ermöglicht. Es muss also dafür gesorgt werden, dass der der Heilstätte vorstehende Arzt mit der nötigen Dexterität zu chirurgisch-plastischen Operationen ebenso ausgestattet sei wie mit der Beherrschung der physikalischen und sonstigen therapeutischen Methoden.

Das Statut der Wiener Heilstätte für Lupuskranke schreibt vor, dass der Vorstand derselben nicht allein in Dermatologie ausgebildet sei, sondern auch Gewandtheit im Operieren, insbesondere in plastischen Operationen haben müsse. Das Operieren lässt sich ja auch von Dermatologen erlernen und in der Tat haben eine grössere Anzahl meiner Schüler schöne Beweise ihrer dermatoplastischen Kunst an den Tag gelegt. Die Wiener Heilstätte für Lupuskranke wird es immer als ihre schönste Pflicht ansehen, Kollegen, die sich hierin ausbilden wollen, soweit als tunlich an die Hand zu gehen.

Eine Heilstätte für Lupuskranke soll aber auch alle anderen Methoden—ältere und jüngere—welche in der Behandlung des Lupus förderlich sind, pflegen. Die Handhabung des Paquelin, besonders des Spitzbrenners und der Heissluftbrennung, soll ebenso bekannt sein, wie die Anwendung von Pyrogallol-, Resorcin- und anderen heilsamen Präparaten; es muss höchste Ausnützung der Vorteile von Röntgen- und Radium- ebenso statthaben können, wie von Quecksilberdampfstrahlen—Kromayer—und der Fulguration. Kurz, es darf in einer Heilstätte für Lupuskranke nichts fehlen, was irgendwie zum Nutzen der Kranken herangezogen werden könnte. Es muss eine solche Heilstätte nicht bloss für operative Behandlung und Phototherapie eingerichtet sein, sondern im wahrsten Sinne des Wortes ein *Zentrum* auch für alle anderen bei *Lupus heilsamen* Methoden darstellen. Dieser Anforderung entspricht die Wiener Heilstätte für Lupuskranke, die vorläufig nur in einem Provisorium untergebracht ist, schon heute. In dem demnächst auszuführenden *Neubau* der Wiener Heilstätte für Lupuskranke wird aber auch für ausgedehnte physikalische, chemische, bakteriologische und histologische Laboratorien sowie für Räumlichkeiten zu Tierexperimenten gesorgt sein, damit neben der Therapie auch neue Wege der Forschung betreten werden können.

In der neuen Wiener Heilstätte für Lupuskranke wird für 20 stationäre, der Hauptsache nach zur Operation bestimmte Kranke Platz sein; an der grösseren Mehrzahl der Kranken wird die Behandlung ambulatorisch durchgeführt. Für diese besteht schon *jetzt*, da sie wegen ihres abstossenden Aussehens nirgends Quartier finden, zur Unterkunft und Verpflegung ein provisorisches *Heim*, das im Neubau inklusive der lupösen Kinder und des Aufsichtspersonals über 60 Betten, in verschieden grossen Zimmern verteilt, enthalten und ausserdem mit Spiel-, Lehr- und Arbeitssälen ausgestattet sein wird. Für dieses *Heim* kommt ein eigener Verein, der "Verein Lupusheilstätte," auf, während für die *Heilstätte* das oben erwähnte Zentrum aller Heilverfahren, ein Kuratorium, nämlich das Kuratorium der Stiftung "Heilstätte für Lupuskranke" sorgt, welches die Behandlung daselbst nach einem mit der Regierung abgeschlossenen "Übereinkommen" ermöglicht.

Auf diese Weise wird in Wien allen Anforderungen entsprochen, um das ersehnte Ziel, das Heil der Lupösen, sicher zu erreichen. Die früher von

einer schrecklichen Krankheit grauenvoll entstellt, von der Gesellschaft gemieden, ja vertossen waren, werden jetzt der Gesellschaft als nützliche Mitglieder wiedergegeben; die früher ihrer Familie, der Gemeinde oder sonst öffentlichen Fonden zur Last waren, können nun geheilt einen Beruf wählen, eine Lebensstellung erlangen, Familie gründen und an den Genüssen und Freuden des Lebens wie andere Menschen teilnehmen; die früher Vermögensverzehrer waren, werden jetzt Vermögensvermehrer.

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